Antic™

The ATARI® Resource

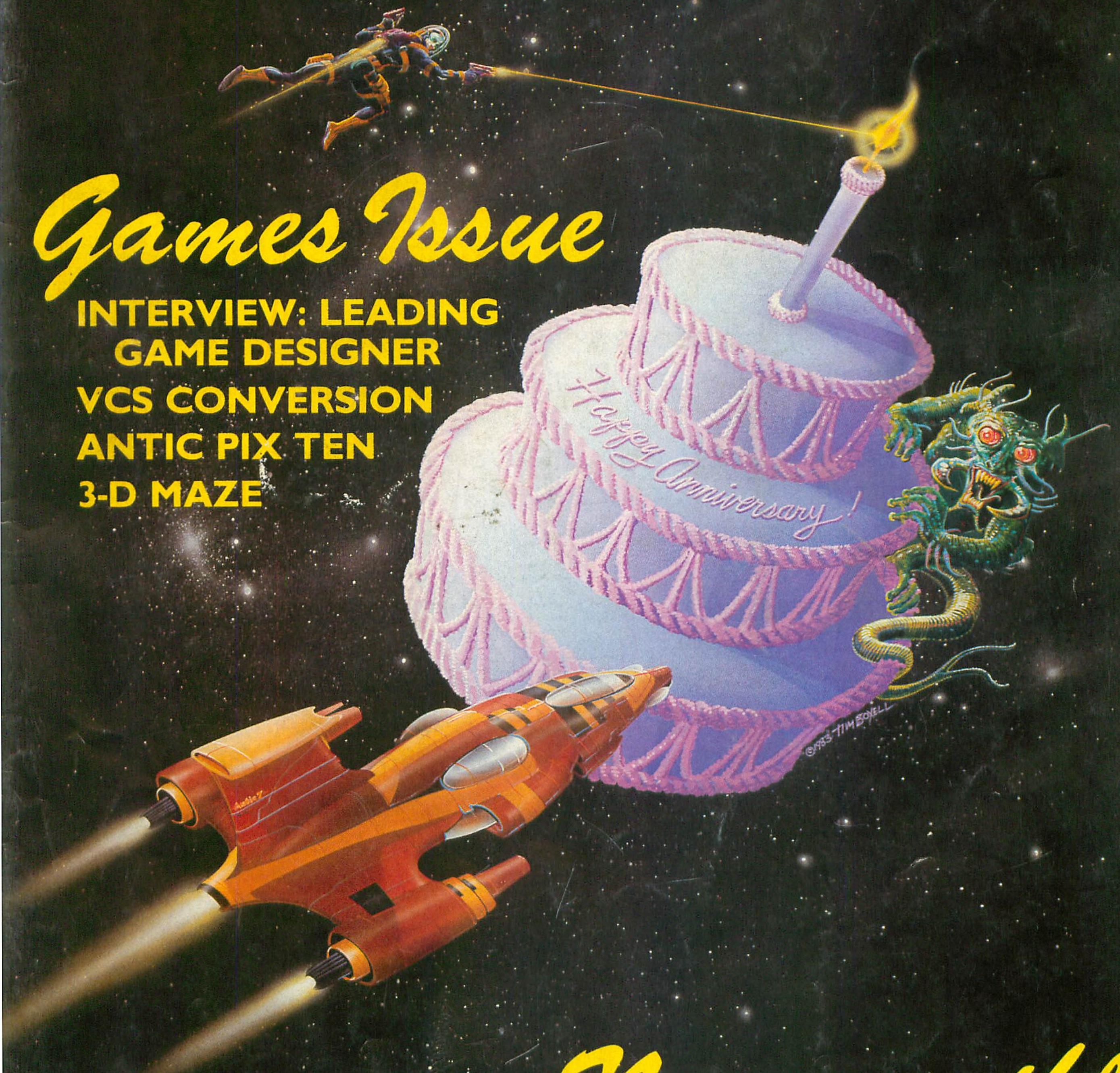
APRIL 1983, VOLUME 2, NUMBER 1

$2.50

COVER ART CONTEST

Games Issue

INTERVIEW: LEADING GAME DESIGNER
VCS CONVERSION
ANTIC PIX TEN
3-D MAZE



Now monthly!

ONLY

THE NEW ATARI 1200XL HOME COMPUTER MAKES SOPHISTICATED GRAPHICS AND SOUND SO EASY TO PROGRAM.

ONLY *the new ATARI 1200XL Home Computer combines custom microchip technology with 64K RAM computing power to deliver graphics and sound capabilities that are so easy to program. The ATARI 1200XL has 11 graphics modes and 5 text modes. (The Commodore 64 and Apple II-e have only 2 graphics modes and 1 text mode.) Additional text and graphics modes allow users to easily program sophisticated graphics effects with relatively few commands, taking full advantage of the 256 color variations available. The sound capabilities of the ATARI 1200XL are also easy to program. Four distinct "voices" spanning 3½ octaves are controlled by a separate microchip, leaving the principal microprocessor chips free to perform other tasks.*

ONLY *the ATARI 1200XL offers a keyboard featuring 8 programmable function keys controlling 16 functions in a 64K computer. (That's twice as many as the Commodore 64). Four new function keys enable you to lock and unlock the keyboard electronically, disable the screen DMA for faster processing time, generate European language or graphics characters, turn the keyboard sound on and off or access the one-touch cursor control. The unique user-definable "help"*

THE NEW

key permits users to self-test ROM, RAM, audio-visual circuitry and keyboard functionality or call up assistance within complex programs. For even more help, Atari gives you a toll-free number to call for product and technical information (800) 538-8543; in California 1-(800) 672-1404.

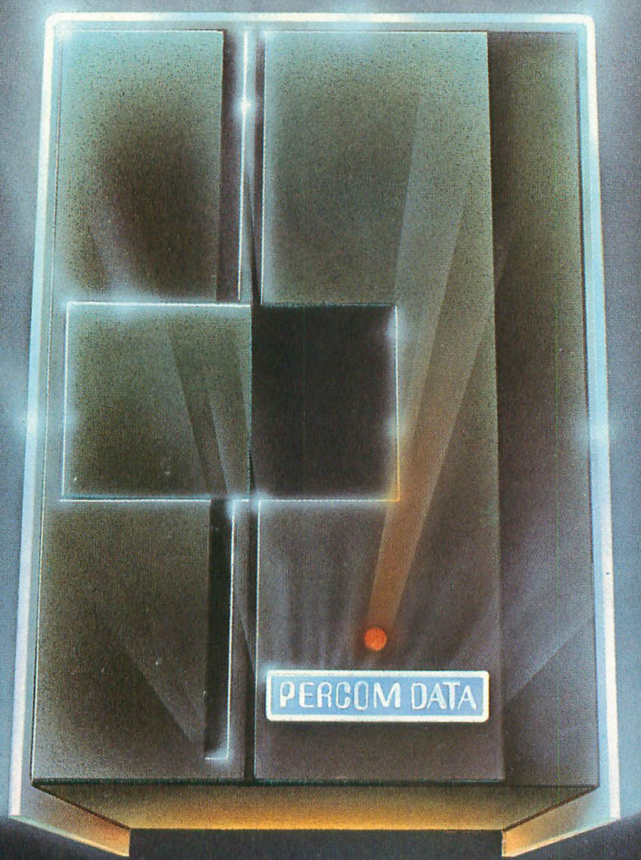
ONLY *the ATARI 1200XL offers you a home computer compatible with virtually all ATARI Computer peripherals and software (compatibility that other new computers like the Commodore 64 don't offer). There are over 2,000 programs and seven programming languages currently available for the ATARI 1200XL. New programs like AtariWriter™ and languages like ATARI Microsoft BASIC, Assembler Editor, PILOT, Pascal, ATARI BASIC, Forth, and Macro Assembler offer you even greater programming challenges and flexibility.*

ONLY *Atari puts so much more in the new 1200XL Home Computer so you get so much more out of it.*



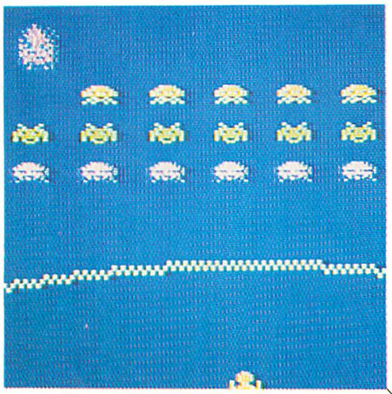
ATARI® 1200XL™

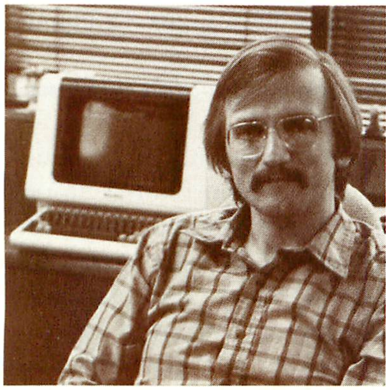
HOME COMPUTER


PERCOM DATA

The ATARI® Resource

APRIL 1983, Volume 2, Number 1







FEATURES

DEPARTMENTS

April 1983,
Volume 2, Number 1
ANTIC—The ATARI Resource, is published twelve times per year by ANTIC Publishing. Editorial offices are located at 600 18th Street, San Francisco, CA 94107. Telephone is (415) 864-0886. ISSN 0745-2527. Second Class Postage paid at San Francisco, California and additional mailing offices. POSTMASTER: Send address change to **ANTIC**, 600 18th Street, San Francisco, CA 94107.

Central European Distributor:
Ing. W. Hofacker GMBH
Tegernseerstrasse 18
D-8150 Holzkirchen
08024 7331

Australian Distributor:
Futuretronics
1076 Centre Road
South Oakleigh, Vic. 3167
Australia
03 579 2011

EDITORIAL

Happy Birthday ANTIC

It's difficult for us to believe, but we are now one year old. What started as a gleam in our eye is now the most widely-read ATARI-specific magazine in existence. We are proud of our accomplishments — and are humbled by those painful lessons some of you have shared with us. Now for our gift to you:

We are now a monthly publication. ANTIC is the first ATARI-specific monthly magazine.

Program listings will now be typeset. We had a typeface designed just for us. This *font*, as typesetters call it, will contain all the special ATARI-graphics characters. We will be using the ATARI, phone equipment, and state-of-the-art electronic typesetting. Check In the Public Domain to see what I mean.

We were one of the first magazines to include the TYPO feature (see reprint this issue). Of course, we went to one of the best to write it, Bill Wilkinson.

We are the only magazine to place our programs in the public domain. This means you are free to copy them, give them to your friends, improve them. You get no hassle, no impossible-to-enforce ownership problems, just useful information, arcade quality games (almost), and fun.

We have grown in editorial content and advertising pages with every issue.

We have been on time with every issue, no small trick.

Now, how do we follow a year that most publications only dream about? Well, we have more regular columns in store. Watch for more tutorial information, jargon-free, and written for you — our active, interested, new reader. Education is a topic we frequently hear about, so look for more coverage.

We'll also be introducing you to those people who make great games and useful software possible. Read Profiles, a regular feature starting in this issue. We will be taking you inside Atari a little more — after all they're right down the road.

We will be providing more color pictures with our reviews — expensive but worth it. And you can expect more question-and-answer format. We intend to lead those of you who want to go, into this ATARI computer age.

Our ATARI audience is growing, more companies start daily. You can expect ANTIC to continue to provide you with interesting reviews, valid comparisons, and how to use your ATARI in ways that you never thought of. We are fortunate that Silicon Valley and Atari Inc. are so near, and we are privileged to call professionally and personally upon some of the most creative people in the ATARI world. We think that adds up to the best magazine you can have on your desk.

Remember, if you own an ATARI you should be reading ANTIC.

Jim Capparell
Publisher

MOSAIC™ 64K RAM SELECT™

The only compatible 64K RAM for

ATARI® 400 and 800

The Mosaic 64K RAM SELECT* will make your Atari† computer more powerful than ever before. No other memory board equals the power, dependability, flexibility, compatibility, documentation and guarantee of the Mosaic 64K RAM SELECT.

This Mosaic design takes full advantage of Atari's internal architecture. The result, for example, means in comparison with any other 48K or 64K RAM system you'll have 30% more workspace with the Atari word processor and 17% more workspace with Visicalc — a true advantage for any disc drive system. For program writers it means 16K RAM of special risk-free storage. No more "page 6" dangers. It's impossible with the Select System for your routines to be violated by the DOS, OS, BASIC or any other existing software. It's safety you can bank on!

Now you'll have 48K RAM hard wired with 4 banks of 4K RAM waiting, addressed above the normal RAM limit. This gives you 52K continuous RAM and 64K RAM total... plus complete compatibility with all Atari software and peripherals.

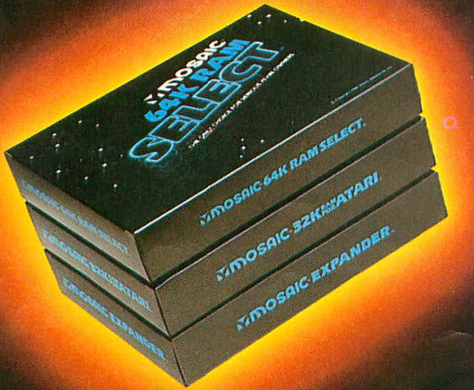
Each Mosaic 64K RAM SELECT comes with step by step picture guided instructions. The best in the industry.

FEATURES:

- 4 year guarantee.
- Complete instructions.
- Easy, no solder installation.
- Complete compatibility with all Atari† products.
- Test cycled 24 hours for reliability.
- Gold edge connectors for better reliability.
- Designed to take advantage of Atari computer's superior architecture.
- Designed for inter-board communication in Atari 800.†
- Always the best components used for superior screen clarity and reliability.
- Low power design for safety and reliability.

CALL FOR YOUR NEAREST MOSAIC DEALER 1-800-547-2807.

MOSAIC™ ELECTRONICS, INC.



*Trademark of MOSAIC ELECTRONICS, INC.
†Atari is a registered trademark of Atari, Inc. Mosaic is not affiliated with Atari.



Totally Awesome!
MINES 00 SAUCERS 00
CHASE 00
PRESS TRIGGER TO CONTINUE
SCORE:000000
SAUCERS:
MINES: 16
CHASE: 09
Fernando Herrera's
ASTRO CHASE
"there is no escape!"™
FOR THE ATARI® HOME COMPUTER
32K
DISK OR TAPE
To Order: Call
TOLL FREE 800-223-1545
nationwide except in New York
First Star Software, Inc., 22 East 41st Street
New York, NY 10017 phone 212-889-1073
ASTRO CHASE, "there is no escape"™ is a trademark of First Star Software, Inc.
© 1982 First Star Software, Inc.
ATARI® is a registered trademark of Atari, Inc.
FIRST STAR SOFTWARE INC
Retail and Distribution inquiries invited.

I/O Board is a forum for information exchange, problems and comments from and for our readers. We edit your letters heavily in order to make space for the ones of more general interest. Some correspondents may receive personal replies to specific questions if they provide a self-addressed stamped envelope. We appreciate the many letters of encouragement, and we consider your criticisms even if they do not appear in I/O Board.

—ANTIC ED

DYNAMIC RAM

I would like to report on the 48K memory expansion kit for the ATARI 400, made by Dynamic Technologies.

I installed one of these for a friend of mine. The kit is well-documented with a 19-page manual of step-by-step instructions and a troubleshooting section. It took two hours to do the job. When we turned on the computer and entered PRINT FRE(0); the TV displayed 37,902 — the amount of free RAM space available.

The kit has been in and running for six weeks, and so far no problems. At $109 this was a very cheap memory upgrade. If you can follow directions and solder, I think this kit will work for you.

Norman McCallum
Roseburg, OR

USER GROUP INFO

I purchased my first few ANTICs on the newstand, then asked for and received a subscription as a Christmas present from my wife. Your Christmas card and Valentine have helped me justify that gift to her, and this letter would not have been written without Tiny Text (ANTIC #6). Can you tell me how to link up with a User Group around here?

Charles Arkebauer
Portola Valley, CA

Information about User Groups can be obtained from Atari, Inc.'s User Group Support Staff, (408) 942-6827, or by writing them at P.O. Box 50047, 60 E. Plumeria, San Jose, CA 95150.

—ANTIC ED

STELLAR IMPELLER

We have entered and played Stellar Defense with great success. We discovered that the following changes improved the flow:

add line

```
183 ST=STICK(0):SQ=STRIG(0):
    POSITION A,22:? CHR$(24);
```

and change line 190 to read

```
190 POSITION A,22:?CHR$(24);
```

If the game is too easy for you, change lines 250, 281, 300, and 751 to limit the number of shots to 50.

Ken Chapman family
Norfolk, NB

ROAD WISE

```
10 POKE 752,1
15 ?"K          I  II  I"
20 ?"E          I  II  I"
25 ?"E          I  II  I"
30 ?"P          I  II  I"
35 ?"           I  II  I"
40 ?"O          I      I"
45 ?"N          I   I  I"
50 ?"           I      I"
55 ?"T          I   I  I"
60 ?"R          I      I"
65 ?"U          I   I  I"
70 ?"C          I      I"
75 ?"K          I   I  I"
80 ?"I          I      I"
85 ?"N          I   I  I"
90 ?"G          I      I"
95 GOTO 15
```

Jeff Beausoleil
age 9
Coventry, CT

AMBITION

I am 12 years old and have been an ANTIC reader FROM THE START. You guys are doing a great, super, excellent and outstanding job! Do you think you could do a series of articles for beginning Assembly Language programmers? I think it would be good for a lot of us out here.

Nicky Shiame
Holbrook, NY

How could we refuse? —ANTIC ED

COSTLY DELAY

Anyone purchasing an ATARI computer should test all functions before the warranty expires. I didn't, and it cost me $45 labor to replace a 36¢ defective transistor in my cassette I/O circuit. If I had just tried my 400 with a 410 Program Recorder I would have discovered it.

Jim Whelan
Moore, OK

BACK SEAT TREATMENT

I'm an ATARI computer owner who enjoys playing games after a hard day's work. I've heard the new 5200 game machine and its cartridges are supposed to top the 400/800 versions. Does this leave the 400/800 in the back seat, or what?

D. P. Adam
San Pedro, CA

The 5200 Advanced Game System is really an ATARI computer dedicated to games. It is based on the 6502 microprocessor, as are the 400, 800 and 1200 computers. The 5200 is scheduled to get an adaptor keyboard that will make it programmable (see Inside ATARI, this issue); but no more so than the computers, which remain equally fine game players. ANTIC will begin regular coverage of these game machines next issue. —ANTIC ED

I/O BOARD

DOUBLE DUTY

I'm shopping for a letter-quality printer to use with my ATARI 800, 810 disk drive and LJK's Letter Perfect. Since I don't own a typewriter, I'm considering an electronic typewriter that could be hooked up to print as well as type. I've looked at Bytewriter, a converted SCM Ultrasonic, and a converted Olivetti Praxis 35. With the interface and cable, any of these will cost about $1000.

I'm comparing this with the SCM daisywheel printer for about $600. I realize that a converted typewriter is not as fast as a printer, but I need some advice.

Perry Kacik
Montpelier, VT

If your volume is light enough, the typewriter conversions should be alright. However, be aware that you will be using a machine for a purpose other than designed — always risky business, especially when remote from service. With any of these be certain *they can be configured for Letter Perfect.* —ANTIC ED

AGHAST AT APX

As a professional engineer I want to draw the attention of ANTIC readers and ATARI users to the inaccurate and possibly harmful representation of nuclear power in the game "Melt Down" from APX.

While it may appear to be harmless fun, the possible misunderstanding by young users both of the actual technology and danger of nuclear power is not at all helpful in these times. The nuclear power industry takes great pains to assure truthful dissemination of information about atomic power.

I personally will not purchase APX products until "Melt Down" is removed from its catalog.

William Becker, P.E.
Hebron, CT

TUFF STUFF

The ATARI 1200XL sounds impressive (ANTIC #6), and I am curious if some of the new features, such as the 14K OS, will be made available for the 400/800? If so, would it be necessary or desirable to wire in the new 6502 variation in a 400/800 to make use of the 14K OS? Does the new OS support floating decimal routines in a manner similar to the Fast Chip made by Newell Industries? Is it feasible to modify the 800 to improve color saturation as evidently has been done with the 1200XL? Will the speech synthesizer in the works be compatible with 400/800 systems? Does Atari have an approximate date of availability set for the speech synthesizer? I have been holding off purchasing a 'voice' for my 800 as I have heard of Atari's intention to market their own model.

Walt Huber
Atwater, CA

Gramma always said, "If you don't know, say so." We don't know, but we'll find out, in a full-scale review of this and other new hardware later this year. —ANTIC ED

ATARI WORD PROCESSOR

I'm having problems with the Atari Word Processor program (version 1.0). As my disk fills up, attempts to back it up using Atari DOS II generate gibberish. The pagination functions also produces strange output. Calls to Atari have not solved the problems. Is anyone else having trouble?

Roy Ramirez
Northridge, CA

We have not experienced these problems, though we don't use Atari Word Processor much at ANTIC. Atari is coming out with an improved word processing program, called Atari Writer, which we expect to review in the near future. —ANTIC ED

RIGHT-HAND SLOT

I would like to know the use of the right-hand slot on the ATARI 800.

Steve Empey
Wilsonville, OR

The right-hand slot is a bay into which properly designed and programmed ROM cartridges can be placed to cause your 800 to do things. There are not many such carts around, but one is Monkey Wrench, by Eastern House.
—ANTIC ED

BAT HEAVEN

We enjoy BATS very much (ANTIC #5) but had two problems. When a bat eats a poisonous bug "off screen" it dies and falls, but never hits the floor, causing an error that voids the game in progress. We solved that by changing the last statement in line 590 to read IF PEEK (53252)=0 AND YPOS 127 THEN 590

Second, long play triggers "attract mode," some phases of which obscure the bat and insects. Adding this line seems to fix that.

585 POKE 77,0

Garry Wick
Los Angeles, CA

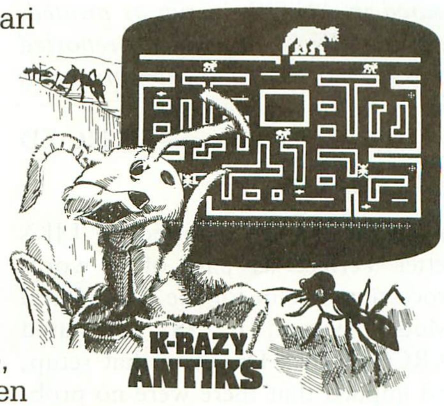
SUBSCRIPTION PROBLEMS

ANTIC has now transferred its subscriber list to a professional data base service. If you have not received your magazine, please write with all the relevant information to **ANTIC Publishing, Subscription Department, 600 18th Street, San Francisco, CA 94107.**

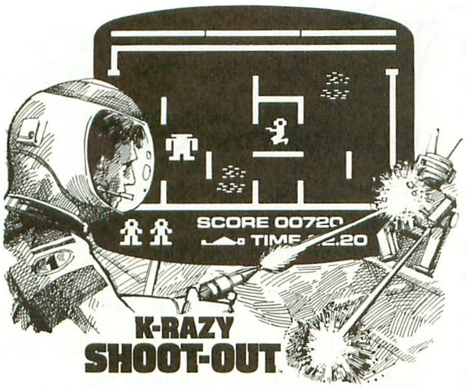
From time to time ANTIC makes its list of subscribers available for commercial mailings. If you do not want you name to be included on such lists please notify us by mail and include a sample of our mailing label so we can identify your account. Send to OFF LIST, ANTIC Publishing, 600 18th St., San Francisco, CA 94107.

Four new ways to get KRAZY!

CBS Software introduces four new fast-action games for your Atari 400 and 800 or Commodore VIC-20 computers.* Each one is so challenging, you'll see why K-RAZY is the name of the game!



Take K-RAZY ANTIKS,™ for instance. If the carnivorous ants don't get you, their exploding eggs might. As you're defending your way through this multi-level maze game, watch out for the hungry anteater's sticky tongue and the flooding rainstorm, too!

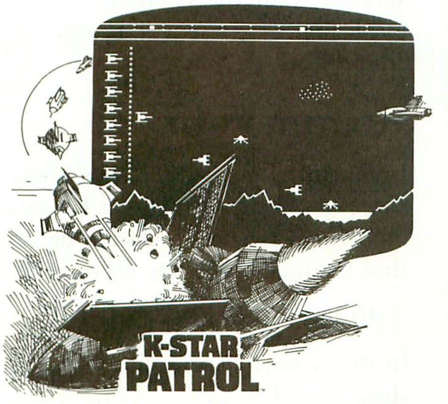


If that doesn't make you crazy, try K-RAZY SHOOT-OUT!™ If you have terrific marksmanship, you can blast through the evil Alien Droids. But only if you're really sharp will you be able to avoid the radioactive walls and escape the deadly Control Sectors.

Or, try K-RAZY KRITTERS.™ You're in charge of the Command Ship, but it will take fast thinking to blast the invading Alien Attackers to save your Star Base from impending doom. Fail, and face the consequences—as your Command Ship is carted off to the Intergalactic Junkyard!



Just as crazy is K-STAR PATROL.™ Because you're the Star Ship Squadron's only hope. Maybe you can defend against the Alien Attack Forces, but can you escape the Intergalactic Leech, too? Oh, and one other thing: replenish your Star Ship's Force Field, or the end is near!

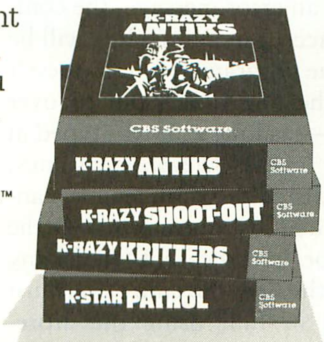


Also, this April, watch for our two new games that look, sound and play so different from anything else, you'll really have to see them to believe them. They're MOUNTAIN KING™ and BOULDERS AND BOMBS™ —both exploding with challenge!

After all, they're from CBS Inc. And everything that name stands for in quality entertainment is built into each and every game.

Remember. Get the most you can out of computer games...and get KRAZY!

*All programs are available as ROM cartridges for Atari® 400™ and 800™ computers. K-RAZY ANTIKS™ and K-STAR PATROL™ are also available for the Commodore VIC-20.™



CBS Software

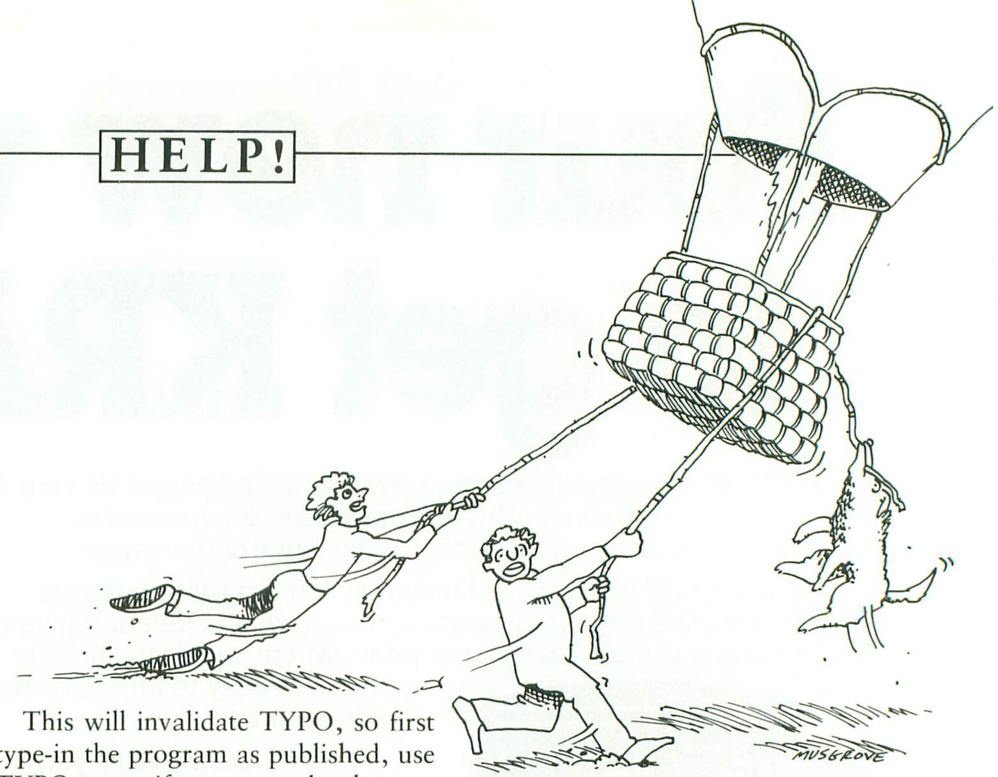
A Unit of CBS Inc., 41 Madison Ave., New York, NY 10010

HELP!

Try as we may, errors and oversights sneak into our magazine. Our regret takes on useful form in this section, where we will report to you information and corrections that will make past issues of ANTIC more accurate.

In general, you should know that most of the programs that have appeared in ANTIC do *run as printed, and that almost all problems reported to us have been due to entry errors on the part of the reader-user.*

—ANTIC ED



LETTER PERCOM

In ANTIC #5 we reported on LJK's Letter Perfect as part of a word-processing system for the ATARI 800 (Model System, p. 18). We used PERCOM Disk Drives in that setup, and implied that there were no problems. Actually, we had encountered, and some readers also reported, a problem formatting data disks for LJK using PERCOM drives.

Both companies confirm this problem. LJK does not use ATARI DOS, nor PERCOM DOS, and formats blank data disks for Letter Perfect using its own DOS, which works fine with ATARI 810 drives, but not with PERCOM drives.

PERCOM's solution is to offer a small program which, when used with its drives, will format blank disks to Letter Perfect specifications. This program is available in hard copy free-of-charge, by writing for the Zero Sector Utility, to Customer Service, PERCOM Data Co., 11220 Pagemill Road, Dallas, TX 75243.

CBOOTMGR

In ANTIC #6, page 78, there is an error in the text accompanying this listing. The next to last paragraph of the article should read, in pertinent part, 'SAVE"C:" rather than 'LIST"C:". Some readers have been confused about how to make a cassette version of this program. Change lines 325 and 330 to read:

```
325 POKE 764,12
330 RUN "C:CBOOTMGB"
```

This will invalidate TYPO, so first type-in the program as published, use TYPO to verify your work, then go back and change the lines.

PAC INVADERS

This listing of PAC INVADERS that appeared in ANTIC #3 contained three lines that contained more than 120 characters each. It is possible to enter these lines using the following procedures:

1. Type "POKE 82,0" in the immediate mode, that is, without a line number. This places the left margin at the left edge of the screen, and allows space for two extra characters per line.
2. Omit spaces wherever possible — that is, omit all spaces, and then go back and insert where necessary as indicated by error messages (after entering the line).
3. Use abbreviations for all BASIC keywords. These can be found in Appendix A of your ATARI BASIC Reference Manual.

As long as you can enter a line without getting an error message, the computer will accept it and the line will be placed in the program in full. It doesn't matter if the line LISTS out to over three lines — as long as it was typed in as three or less. However, such lines, after being listed their full length, cannot be edited as normal using the screen editor. In this case, to make any changes in the line, the entire line must be retyped in full, using the aforementioned space-saving techniques.

EXTENDED DIRECTORY

A line of code was left out of Extended Directory (ANTIC #6). Line 1430 should be inserted as:

```
1430 MOD    .BYTE "dup.SYS"
```

This allows the routine at line 1280 (label: LOOP1) to change the name of DUP.SYS to dup.SYS, which prevents loading the new DOS with the old utilities package. Incidentally, the last seven bytes in the assembled listing, as published, represent the new name "dup.SYS."

TUT, TUT; UT, UT

In Starting Line (ANTIC #6) there are three errors. In each case a 1 appeared incorrectly where a $ should be. In the first listing change line 40 to read:

```
40 INPUT #1, TITLE$
```

In the second listing, lines 20 and 60 should read:

```
20 PRINT CHR$(125)
60 PRINT CHR$(A);: GOTO 40
```

We very much regret errors like this in material for beginners.

MEMORY MAP

On page 97 of ANTIC #6, Memory Map should show in location 766 ($2FE) that the hexidecimal value for EOL (end of line) is $9B, not $98.

MAMA'S BOY

by RICHARD KUSHNER

What I am about to admit is difficult. I am a MAMA's boy (a Middle Aged Maze Addict). I'm just crazy about maze games. Show me the latest text adventure and I'll yawn. Show me a new shoot-em-up and I'll defer to my sprained thumb. But maze games are something else.

Since I've played them all, or all I can find, I will state flat out that nothing yet has topped PAC-MAN. The ATARI computer version rates very high with me as a good rendition of the arcade phenomenon. It would have been nice to include the intermission "cartoons" of the original, but that is a small quibble.

What makes PAC-MAN so good, and some of the other games fall short? It mostly comes down to what I can only describe as "feel". The compelling thrust of PAC-MAN grows and grows. The sound increases in volume and the ghosts move ever faster as you advance through the maze. The ghosts' movements seem to become less random and more attuned to your every change of direction. Decisions can sometimes be made by careful planning, but, inevitably, success or failure comes to depend on those split second decisions — *Should I grab the glowing dot now? Should I duck through the side of the tunnel? Should I go left or right, up or down?*

But even that is not enough to capture the imagination of a nation. PAC-MAN is also manageable, by which I mean that, with a little practice, *anyone* can get through the first few levels. You don't have to have eyes in the back of your head, or the reflexes of a 10 year old, to survive — at least for a while. This is the chief drawback of maze games like CROSSFIRE or MOUSKATTACK. Both of these are graphically the equal of PAC-MAN, but I simply am unable to look in three directions, move, and shoot, all at the same time (as CROSSFIRE requires), or lay pipe, look for bad joints, avoid cats, manage traps and move, all at the same time (as MOUSKATTACK demands).

Game designers, please remember that the home computer is not like the arcade machine where you need at least 20 quarters per hour to make big bucks. There is room for gradual escalation, and a game that can be played for more than 30 seconds before Armageddon wipes out the good guys. You need to consider the frustration level of your purchasers, who plunk down $30 to $50, based largely on the cover art, but who will only recommend your game if it is a "good" one.

Here are a few more observations on the extra touches that make games good:

Please let me skip the introduction. Sure, it looked terrific the first time I saw it, and amusing the fifth time, but after that it was just plain *boring*.

Don't make me start over every time I play. Give me the choice of starting at *some* of the advanced levels, even if you want to reserve the highest for those who earn them. Aztec Challenge lets you continue right where you were when you got wiped out. This allows you to get far into the game, without having to plod through all the "I've been there before" sections.

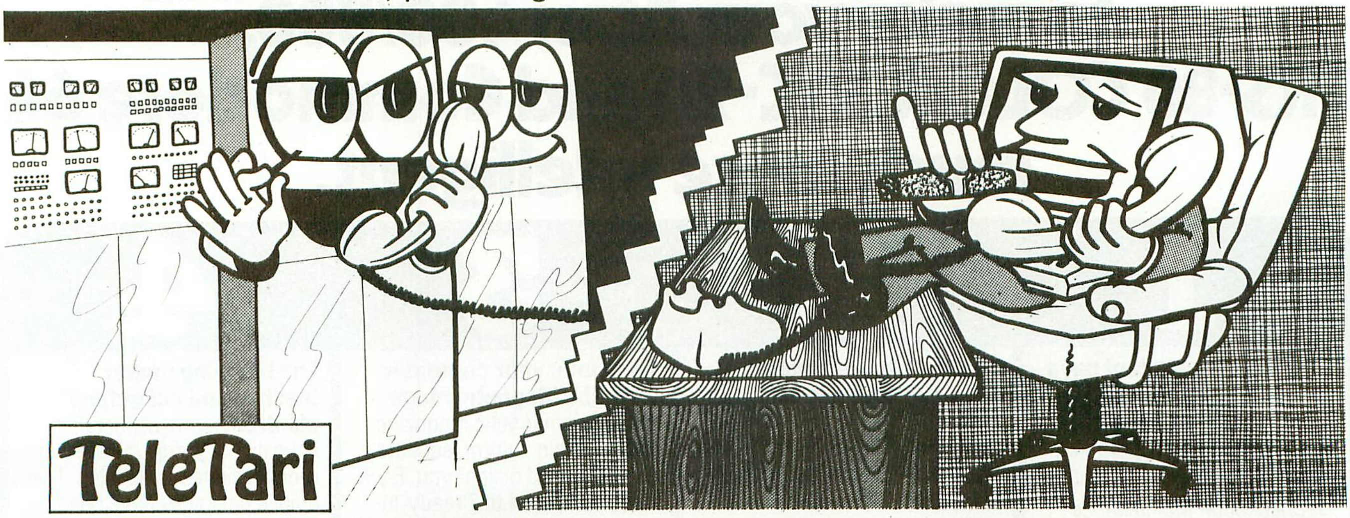
Everyone has discovered vertical blank interrupts and uses them to wedge music into most of the Atari games on the market today. Music should be an option. It wears on the nerves after playing a while, even though it is fun sometimes.

How can you determine if you are a maze game addict? What measures can you take to cure this dreaded disease? The symptoms are easy to describe: damp palms, tension ache in the shoulders, sore wrist, and the search for the "perfect" joystick.

The cure, I'm afraid, is worse than the disease. You can't just taper off. No, like the alcoholic, you have to give it up entirely, and avoid going to arcades. "Cold turkey" is the only sure cure. Probably it would be best to get rid of the computer altogether, so as not to be tempted. But wait a minute . . . I heard that Digdug, QIX and Zaxxon are coming out soon. I'd better go do my joystick exercises so I'll be in shape when they arrive. Oh, well, there are *worse* habits.

DON'T ASK PROVIDES THE MISSING LINKS

the link between your modem and the outside world. For hassle-free communications, phone right in with TELETARI, The Friendly Terminal.

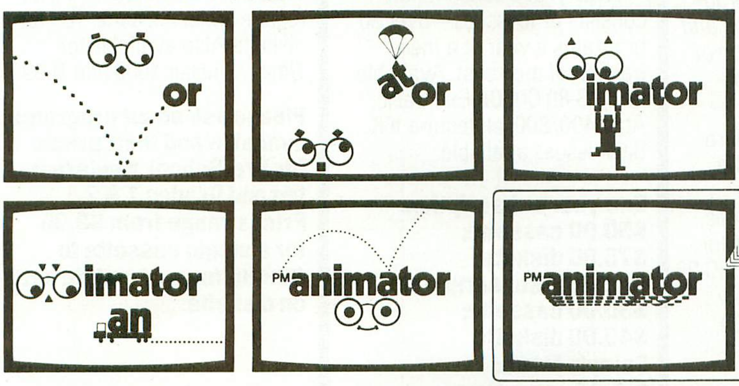


Your Atari has never had such easy access to the whole world of telecommunications – bulletin boards, news reports, large time-sharing computers, the works. Now it's a snap to tap into all these, and it's just as easy to transfer your program or text files to and from a remote computer. Meet TELETARI, The Friendly Terminal. It's just what your modem needs: a powerful, adaptable telecommunications package that's a cinch to use. With TELETARI, you simply choose the desired communications function from a menu. Commonly used terminal parameters are included in the program, but you can change them to suit your needs with a couple of keystrokes, using another handy menu, and store the ones you plan to use again. TELETARI's generous buffer stores up to 20K, so you can review, print, or save received information long after you've hung up the phone. You never knew using a modem could be so convenient. Because it's very flexible, TELETARI is compatible with most modems and a wide variety of computers. And because it works through the RS 232 port, TELETARI is not limited to modem/telephone uses. Put it to work in any RS232 application your imagination can devise – even operating a laser disk!

- buffer of up to 20K
- menu-driven
- highly adaptable
- supports all 850 options
- compatible with 1200 baud modems and BiT 3 Full-view 80™ board
- suitable for any RS232 application

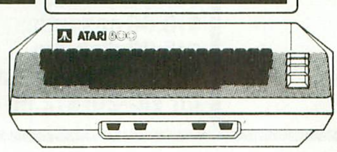
$39.95 Requires Basic, 32K RAM, disk, 850 Interface

the link between BASIC and arcade-style graphics. Draw and animate pictures for your own BASIC games and other programs with pm ANIMATOR. Create running men, flying rockets, moving figures of all kinds.



Now available from DON'T ASK

PM animator



BASIC programmers, pm ANIMATOR puts the power of Player-Missile Graphics at your fingertips.

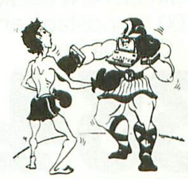
$34.95 Requires 32K RAM, BASIC, disk.

To order direct from Don't Ask, send a check or money order, or call to order COD. Add $2.00 for shipping and handling. California residents add 6% sales tax (6.5% if you reside in L.A. County).

the link between fast game action and verbal learning:

WORDRACE

Kids and adults, increase your vocabulary while you compete in this exciting word game.
Disk version:
3 levels of play – Beginner, Regular, Challenge
Requires 32K RAM, disk, BASIC. $24.95
Cassette version:
2 levels of play – Beginner, Intermediate
Requires 16K RAM, cassette, BASIC. $19.95
turn WORDRACE into a history game or a famous athletes game, and get more vocabulary words, with the WORDRACE accessory disk: CLAIM TO FAME/SPORTS DERBY. 3 new games in all.
Disk only. Requires WORDRACE disk. $19.95



the link between you and what your Atari is really thinking:

ABUSE

the insult-exchange program.
Have you cursed out your computer? Now it can understand you and answer back!
Requires 40K RAM, BASIC, disk. $19.95
Release your aggressions! Inflict ABUSE on anyone who's got it coming!

DON'T ASK
the link between technical excellence and the fun of computing. Why do we give you so much? Don't Ask.

DON'T ASK COMPUTER SOFTWARE INC.

2265 Westwood Bl., Ste. B-150
Los Angeles, CA 90064
(213) 477-4514 or 397-8811

ANATOMY OF AN ATARI

by RICHARD HERRING

HAVE YOU EVER WONDERED WHAT THE INSIDE OF YOUR ATARI looks like? Just where *is* ANTIC anyway? If you are like me, you probably sit down in front of your computer nearly every day. You can find its power switch in the dark. The outside of your computer, like Picture 1, is very familiar. You see four controller jacks in front, side panel on the right, cartridge door on top and TV switch-box cable out back. But what about the inside — the anatomy?

We all know something about the anatomy of the human body. Even though we do not know all the names or understand all the processes. What little we do know helps us. Knowledge of the body's structure allows us to use it properly and abuse or damage it less often. The same is true for your computer. You will probably never need to take apart the ATARI, just as you will probably never have to perform surgery on a person. But if you have a mental picture of the physical object it can help you understand it better.

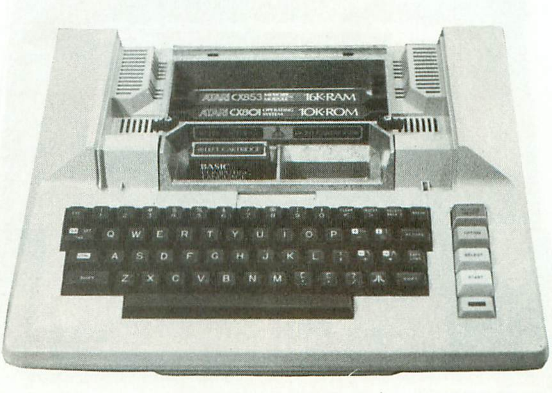
When you open the cartridge door of an ATARI 800, you find two cartridge slots. With few exceptions, all cartridges go in the left slot. Under the cartridge door and just above the break key, is a little slot which contains the ATARI's second on / off switch. As soon as you open the door, your computer is automatically turned off. This prevents you from inserting or removing cartridges with the power on, so no static charges can be sent through the computer's circuits to damage sensitive chips.

Once the cartridge door is open, you can access the memory bank by rotating the two black clamps and lifting the entire ribbed top cover toward you.

Here (Picture 2) are the Operating System 10K ROM and whatever RAM modules you have installed. That is about as much disassembling as most people ever need to do. So, let's take an imaginary tour through the rest of the computer.



1) ATARI 800

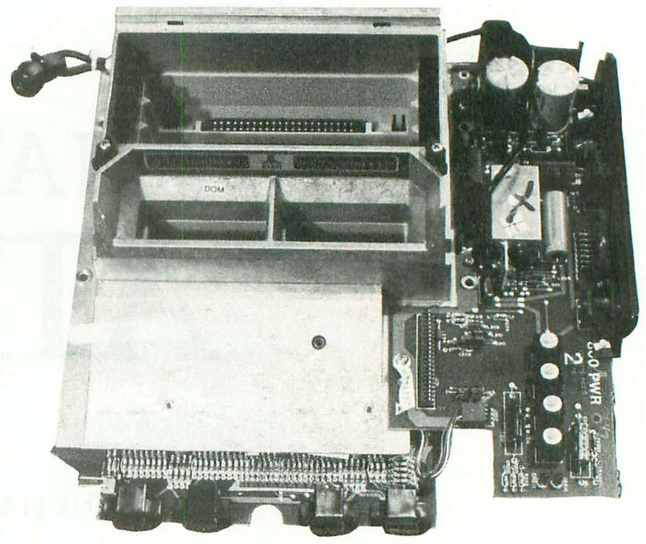


2) Top cover removed

When it's turned over and the screws are removed, the bottom of the case lifts off. The view (Picture 3) is not terribly revealing. Notice that one side, under the [ESCAPE] and [TAB] keys, is basically empty space. In the corner under the [CONTROL] key, you see the little speaker which is responsible for the beeps, as well as for other sounds. This speaker simply sits in a circular ridge formed in the top of the computer's case (Picture 4). The motherboard is shown (Picture 3) occupying the center half of the computer. Looking at its bottom is not very interesting, since most of it is covered with a metal plate. On the side opposite the speaker, you see the bottom of the power-supply board.

Removing more screws and unplugging one connection allows the boards to be lifted out as a unit. This leaves the case top with the keyboard still installed. The detached keyboard ribbon (Picture 4) can be seen with the bottom of the keyboard still visible in the otherwise empty top half of the ATARI's case. The four yellow keys are seen clipped into housings formed in the case top. The bottoms of these keys rest on switches located on the power-supply board.

The ATARI 800's components reside primarily on three circuit boards. Lying horizontally under the keyboard and memory bank, is the motherboard. This is the largest circuit board in the computer. The motherboard runs from front to back and is about one-half as wide as the 800's case. It is still covered (Picture 5) by the metal case which surrounds the memory bank, but we can see it completely exposed (Picture 7). Attached to the right side of the motherboard is the power-supply board, one side of which is the black side of the computer. That panel holds the on / off switch, power jack, etc.

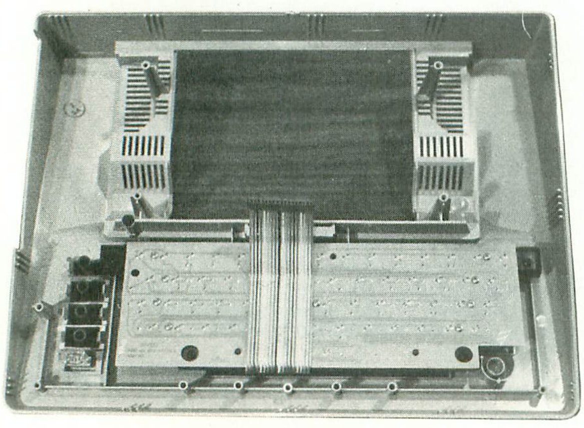


3) Bottom of case removed

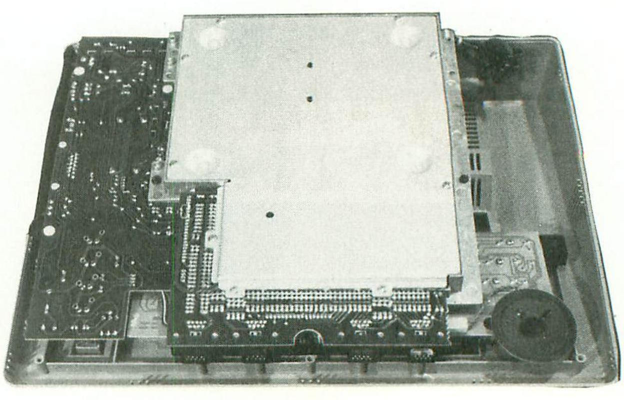
The last board in the 800 is the personality board. It plugs vertically into the motherboard and stands behind the memory bank. It is still inside the metal case (Picture 5), but you can see its top (Picture 7) and how it looks when removed (Picture 8).

Here's a good view (Picture 6) for the power-supply board after it has been detached from the motherboard. Along the bottom of the picture is the black side panel of the 800. Among other functions, this board converts AC from the external power adapter to DC used by the computer. The four round white posts on the left side of Picture 6 are the [START], [SELECT], [OPTION] and [SYSTEM RESET] switches. The power-supply board connects electronically to the motherboard via the long twenty-two hole connector on the arm protruding toward the top of Picture 6 and by the four-pin connector just below the left end of the twenty-two hole connector.

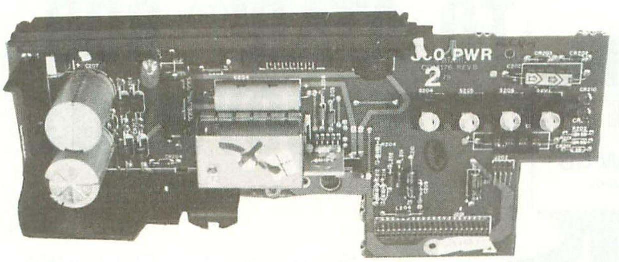
The motherboard is shown (Picture 7) with its metal case top removed. The four joystick controller jacks are at the bottom of the picture. The plug sticking out at the lower right connects to the power-supply board. Just above that



4) Top of case with keyboard



5) Main circuitry



6) Power supply board

plug is the twenty-two pin connector which also attaches to the power-supply board. The two pins protruding from the lower left of the board, just above the #1 controller jack connect to the 800's speaker.

Also on the motherboard are the two chips POKEY and PIA. POKEY, the higher of the two big rectangular chips is responsible for the four semi-independent ATARI audio channels. In other words, POKEY is the music expert chip. But its responsibilities do not stop there. In addition to scanning and controlling the keyboard, POKEY also serves as timer, random number generator, maskable interrupt control and serial communications port.

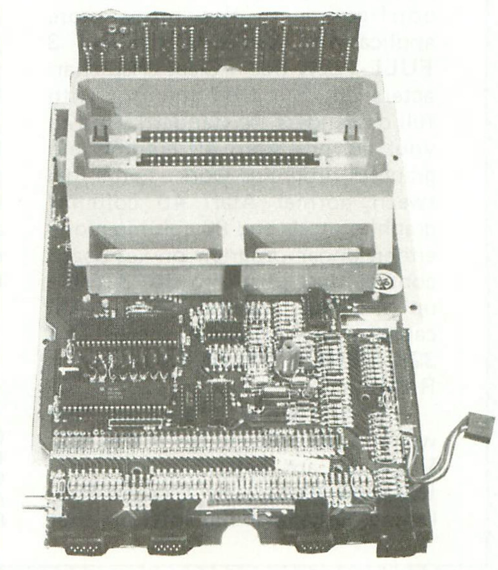
The PIA is the big chip just below POKEY. PIA means Peripheral Interface Adapter. Like POKEY, PIA acts as a maskable interrupt control for peripherals. Further, PIA is responsible for peripheral control and interrupt lines and, for all you game fans, reading from and writing to the joystick jacks.

The upper half of the motherboard (Picture 7), basically consists of slots for ROM and RAM boards. The rearmost slot, however, contains the ATARI's third circuit board, the personality board, also called the CPU board. The personality board plugs into the motherboard using the same type of connector as a RAM cartridge. Its chips face the rear of the computer so they are just above the hole where the TV switch box wire comes out of the back of the ATARI.

On the personality board (Picture 8) lie the three remaining major chips of the ATARI. To the left is ANTIC. ANTIC is responsible for controlling vertical and horizontal fine scrolling and light-pen registers. It is also a vertical line counter, direct memory access (DMA) control, nonmaskable interrupt control, and WSYNC. Do not worry if you do not know the purpose of all those functions, just know that ANTIC has a lot of responsibilities.

The big chip in the center is the CTIA or GTIA. Depending upon how old your ATARI is, you have one or the other, never both. The GTIA chip adds Graphics Modes 9, 10 and 11 to the CTIA's Modes 0 through 8. Although the GTIA is downward compatible (virtually all software designed for the CTIA will still run) the colors of the graphics displays for some software may change.

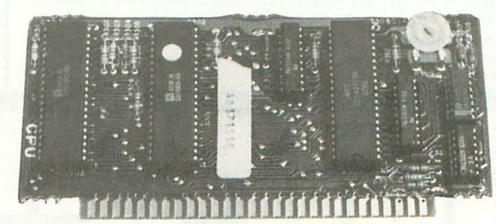
The GTIA is responsible for color luminance and Player/Missile objects. With four players and four missiles available, GTIA must keep track of their individual sizes, horizontal positions, collisions and priority. By priority, I mean determining which of two overlapping objects will be visible. GTIA also controls miscellaneous input/output functions like switches and triggers.



7) Motherboard

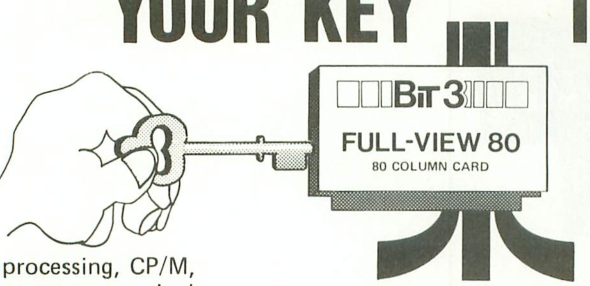
The last big chip, on the right side of the personality board, is the 6502 CPU. This is the brain around which the ATARI computer is designed. Since the 6502 is used in other personal computers, the ATARI has a number of peers. The use of the same CPU by two different computers does not mean that they are compatible or that software written for one will run on the other. It does mean that Assembly Language programmers may be able to convert software from one machine to the other with relative ease. This is because all versions of the same CPU will have similar sets of commands, or instruction sets, at the machine language level.

Now that we've looked at the inside of an ATARI 800, please do not take this little tour as a manual for disassembling your computer. All 800's are not put together in exactly the same fashion. But do use your new knowledge of machine anatomy when you try to make your computer do tricks.



8) Personality (CPU) board

YOUR KEY TO ATARI® 800 ENJOYMENT



Get professional 80 column word processing, CP/M, data managment, remote terminal configurations, plus many more applications thanks to the BIT 3 **FULL-VIEW 80.** Clear crisp characters on your CRT monitor with full descenders are standard. And all your current Atari 40 column and graphics programs work: switch between normal Atari 40 column/graphics mode and 80 column mode either under program or keyboard control. Just plug into slot 3, cable up and run. Maintain 48K RAM capacity by installing the BIT 3 **32K MEMORY PLUS** RAM card in RAM slot 2.

Some word processors that work in 80 columns on the FULL-VIEW 80 are Letter Perfect from LJK and Atext-1 by Elcomp Publishing. Other popular software that runs with the FULL-VIEW 80 is Atari's Assembler Editor, Basic Cartridge, Macro Assembler, and PASCAL; Optimized System's Basic A+, OS/A+ and EASMD; Microsoft's BASIC; Teletari by Don't Ask Computer and T.H.E. Smart Terminal by Binary Computer Software. More applications are being added every day including CP/M by Software Publishers.

See a review of the FULL-VIEW 80 in Antic, December 1982/January 1983, pages 18 and 19. Other reviews available upon request.

Full-View 80 . . . . $299.00

32K Memory Plus $80.00

OTHER FINE PRODUCTS FROM BIT 3

For Apple computers: Full-View 80, 2 Serial Channel Card. **For IBM PC computers:** Multibus Expansion; **General products:** RS232 Gender Changer/Pin Reconfigurator.

CONTACT BIT 3 OR YOUR DEALER FOR PURCHASE.

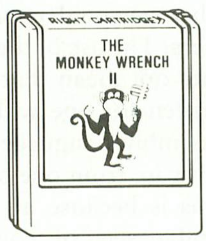
BIT 3
COMPUTER CORPORATION

8120 Penn Avenue South
Minneapolis, Minnesota 55431
612–881-6955

VISA-M/C

NEW THE MONKEY WRENCH II
A PROGRAMMERS AID FOR ATARI 800
NEW AND IMPROVED — 18 COMMANDS

If you are a person who likes to monkey around with the ATARI 800, then THE MONKEY WRENCH II is for you!! Make your programming tasks easier, less time-consuming and more fun. Why spend extra hours working on a BASIC program when the MONKEY WRENCH can do it for you in seconds. It can also make backup copies of boot type cassette programs. Plugs into the right slot and works with ATARI BASIC cartridge.



$59.95

The MONKEY WRENCH provides 18 direct mode commands. They are: AUTO LINE NUMBERING — Provides new line numbers when entering BASIC program lines. RENUMBER — Renumbers BASIC's line numbers including internal references. DELETE LINE NUMBERS — Removes a range BASIC line numbers.

VARIABLES — Display all BASIC variables and their current value. Scrolling — Use the START & SELECT keys to display BASIC lines automatically. Scroll up or down BASIC program. FIND STRING — Find every occurrence of a string. XCHANGE STRING — Find every occurrence of a string and replace it with another string. MOVE LINES — Move lines from one part of program to another part of program. COPY LINES — Copy lines from one part of program to another part of program. FORMATTED LIST — Print BASIC program in special line format and automatic page numbering. DISK DIRECTORY — Display Disk Directory. CHANGE MARGINS — Provides the capability to easily change the screen margins. MEMORY TEST — Provides the capability to test RAM memory. CURSOR EXCHANGE — Allows usage of the cursor keys without holding down the CTRL key. UPPER CASE LOCK — Keeps the computer in the upper case character set. HEX CONVERSION — Converts a hexadecimal number to a decimal number. DECIMAL CONVERSION — Converts a decimal number to a hexadecimal number. MONITOR — Enter the machine language monitor.

In addition to the BASIC commands, the Monkey Wrench also contains a machine language monitor with 16 commands used to interact with the powerful features of the 6502 microprocessor.

ATARI AND PET EPROM PROGRAMMER



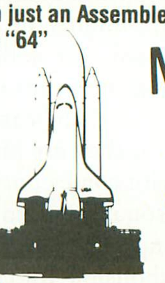
Programs 2716 and 2532 EPROMs. Includes hardware and software. PET = $75.00 – ATARI (includes sophisticated machine language monitor) = $119.95

Eprom Cartridge- A.P.C. board and case which can be used in the ATARI 400 or 800 in the left or right slot. Uses 2532, 2732, or 2716 EPROMs. May contain up to 8K bytes. **$19.95**

Memory Test- Make sure your RAM memory is normal. **$6.95** or **$9.95** on disk.

Typing Exercise- A typing drill program for beginners and experts. On disk. **$12.95**

More than just an Assembler/Editor!
Now for the "64"



It's a Professionally Designed Software Development System

MAE for PET APPLE ATARI ~~$169.95~~ New Price $99.95

Blast off with the software used on the space shuttle project!

- Designed to improve Programmer Productivity.
- Similar syntax and commands — No need to relearn peculiar syntaxes and commands when you go from PET to APPLE to ATARI.
- Coresident Assembler/Editor — No need to load the Editor then the Assembler then the Editor, etc.
- Also includes Word Processor, Relocating Loader, and much more.
- Options: EPROM Programmer, unimplemented opcode circuitry.
- STILL NOT CONVINCED: Send for free spec sheet!

5¼ INCH SOFT SECTORED DISKETTES



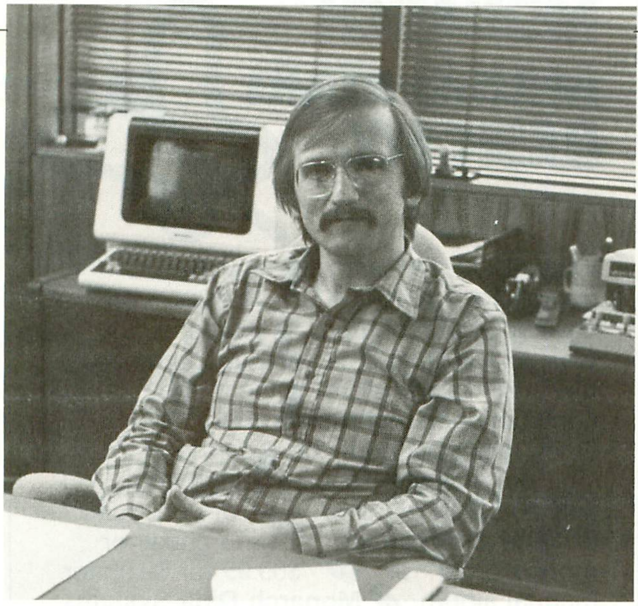
Highest quality. We use them on our PETs, APPLEs, ATARIs, and other computers. $22.50/10 or $44.50/20

EPROMS 2716 = $4.50 2532 = $7.50

Eastern House

3239 Linda Dr.
Winston-Salem, N.C. 27106
(919) 924-2889 (919) 748-8446
Send for free catalog!

VISA® MasterCard



IHOR WOLOSENKO

Hanging ten on the software wave

by ROBERT DEWITT

Ihor Wolosenko is a partner and co-founder of Synapse Software, an originator of **FileManager 800** *and* **FileManager +**, *as well as many popular games. He was born in Austria of Ukrainian parents, and immigrated to the U.S. following World War II. His parents, both professional people, settled in Queens, New York, where Ihor attended Stuyvesant High School, widely known for its science graduates. At the time, however, Ihor was more interested in drama and psychology (not to mention science fiction), and he followed these interests through college at C.U.N.Y.*

After graduation he gravitated to Boston where he established a successful photography studio and agency, doing still shots for many major accounts. After about ten years he sold out, "to escape the winters and find new interests." Berkeley, California, became his landing pad. For some time he studied Tibetan Buddhism and a form of psychology known as neurolinguistic programming. He began to counsel clients and hold workshops in this field, and it was about this time that he discovered computers. Since then, of course, the company he started has grown tremendously and is a driving force in computer game design, not just for ATARI, but in general.

ANTIC: So you decided a computer would make a neat toy?
WOLOSENKO: Yeah, I looked at the Apple and a bunch of others. I saw Star Raiders on an ATARI and asked if the Apple could play Star Raiders. They said "no," so I knew I wanted the one with Star Raiders. I got an ATARI 800.
A: What kind of things did you do with it?
W: BASIC programming, and a little bit of everything. When it's new, everything is exciting. I read the books, then I got into the Assembler Editor, but by that time I had met Ken already.
A: You mean Ken Grant, your partner in Synapse?
W: Yes. He was working for the Federal Reserve Bank in San Francisco, where he was Vice President in charge of data processing. I figured, well here's a heavyweight who's been in computers a few years.
A: You met him as an ATARI user?
W: Yes, a mutual friend told him about me and he called me out of the blue. He lived in Kensington and I lived in Berkeley, so I went over to his house and we talked about computers. He showed me some of the programs he had written, including his data base. I thought it was great because I needed a data base for all my clients and workshop people. I used it a bit, but it kept screwing up. I said, hey, let's get this thing together, and I think you can probably market it. He said, "Well, I really don't have the time, but let's form a company to put this thing out. You do the documentation, the implementation, the interface and the graphics — what it's going to look like." I said, fine, and we did. That's how **FileManager 800** started.
A: He did the actual routines?
W: The architecture, the structure. Then we decided we really couldn't go to market with just one program. There was another guy at the user group, Rob Re, who had written **Dodge Racer**. We invited him to make his game our other product, and he agreed. Now the FileManager, to get it into the shape we wanted, took longer than we thought. We started working on it seriously at the end of November, 1980, and hoped to get it out by May of '81, but we didn't ship any until about August. We had to recall the first hundred or so because there were a lot of bugs in it. We finally got it finished about October. It took a year to get it done right, and I was working on it almost full time. Ken was working hard on it too, even though he had another job. We were really cranking.
A: Were you surprised at the amount of work it took to bring a product like that to market?
W: Oh sure! We had been optimistic, but I just didn't feel right about letting it out until it was the way I wanted it to be and that is: completely easy to use, completely friendly. We have piles and piles of notes from that period.
A: Can you chronicle the growth of the company?
W: First we had FileManager and Dodge Racer. Then, around November of '81, Mike Potter came to us and said

continued on page 23

IHOR WOLOSENKO *continued from page 21*

that he didn't want to work for Crystalware anymore. He asked if we would be interested in picking up **Protector.** We were very interested in Protector, but I wanted to see some changes in it and take some of the bugs out. So we agreed to that, and once we got it out, people really responded positively to Protector — because it *worked.* Then we began working on two other games I had in mind, **Chicken** and **Slime.** Mike and I were working on Chicken and I hired another guy to work on Slime. But, he turned out to be pretty flakey . . . He wasn't getting anywhere and he became impossible to work with. Finally he started having psychic experiences with his disk drive — such as fire coming out of it. He just flaked out.

I realized I simply had to go with my gut feeling as to whom we could and couldn't work with. I then gave Slime to Steve Hales; he just started with it from scratch since he wasn't able to use any of the obscure code this other guy had written.

A: Were you taking on these programmers on a project basis rather than as employees of the company?

W: Yeah. Steve was working on Slime and Mike finished Chicken and began developing **Nautilus.**

A: Who came up with the idea for **Shamus?**

W: Well, William Mataga came to us with a game that was really a replica of **Berserk** that he'd put together. But, as interesting as it was, I didn't want to put out just a reproduction of another game. For one thing, I don't want to get sued and, also, I just don't think it's kosher. So we decided to take the action of Berserk and turn it into a much more interesting game.

A: After Shamus, the ball really started rolling for Synapse?

W: Yeah. More and more people were attracted to us because of the quality of our products. Russ Segal, a student at University of California at Berkeley, came to us and I put him on the project of working up **Picnic Paranoia.**

A: Are these all Assembly Language products or BASIC products with Assembly Language routine?

W: All Assembly Language. Well, now, FileManager was not all machine language. It was BASIC with about a third of it Assembly Language.

A: Were Synapses' first offices at Ken's house?

W: Well, actually the mailing address was Ken's house, but the actual office was in my room at Berkeley. Then I moved to a larger apartment; one bedroom was the shipping room, one was my sleeping quarters, and the living room served as the office.

A: Very similar to ANTIC's situation.

W: Exactly. From there we moved up to Coventry, where we had six bedrooms and five people working. Our next move was into 6500 square feet on Jacuzzi Street last August. We just recently moved to this place, which has 22,000 square feet housing 35 employees.

A: Of course, 20,000 of that is your office!

W: Well, I like to play basketball in my office.

A: What do you have on the drawing boards right now?

W: We have a three-dimensional point-of-view game called **Dimension X** which will be out shortly. We also just released **Fort Apocalypse** and another one, **Survivor.**

A: Tell me something about Survivor.

W: Survivor is a space game. There are four space fortresses with gun emplacements all around. The object is to break through these gun emplacements and blow up the fortresses. Because there are continuously-scrolling vertical and horizontal screens, there are no spatial limits to the game. It's very important to me when I design a game to have as little limitation and as much flexibily as possible. For instance, **Pac-Man** is very set. But with Survivor you can go anywhere you want, even though there are ships constantly attacking you. In Survivor there are three different kinds of enemy ships: one mimics your motion, another goes directly for you, and one circles around you, and they change their strategies all the time. This means you can't use the same kind of maneuvers with each ship because it won't always work.

The same holds true for characters. We're releasing a game called **Pharaoh's Curse** in about two weeks. The action takes place inside a pyramid which has about 18 rooms holding lots of treasure. There's a pharaoh, a mummy and a bird that carries you away. Graphically it's very interesting — another dynamic game like Shamus. One of the nice things about the characters we're creating for games now is that they have a degree of existence independent from the operator of the joystick. In other words, when one of the characters is just standing around he might turn from side to side, look around, and perhaps even take a step in one direction. If the operator is not doing anything with the joystick, I want those characters to seem alive, so that there's a sense that they exist without you controlling them. I think that is very important psychologically, and I want to create that kind of life in our games.

We also have **Shamus, Case II**, coming out; **Drelbs**, and **Necromancer.** Necromancer is a totally unique game. It consists of three phases. In the first phase you grow an army of apprentice trees; in the second phase you go down through these caverns, using your trees — which are actually animated — they walk around crushing out spiders. At the third phase you meet the evil wizard, and so on. There's a whole apocalypse at the end.

A: Do you spend a good portion of your time on game design, and do you consider that your specialty in this company?

W: Well, actually there are two things. I focus both on game design and management of the company from the point of view of growth, and what we need to do to become the most successful software company. So far we've been able to make the right decisions. We're branching out now to make products for the other computers. We'll be out on

continued on next page

the Commodore 64, the TI, the Radio Shack Color Computer and Apple. Synapse now has 40 programmers working on projects.

A: Do all of them work here at Synapse?

W: No, some work here and others work out of their homes.

A: What kind of a deal do you offer a programmer?

W: Well, it depends on whether it's an original game or a conversion. We offer anywhere between 10–20% in royalties on disk and cassette games. We offer a lower royalty on ROMs because those sales are much greater than disks or cassettes, and also there's more up-front money needed to make ROMs.

A: Does Synapse solicit games from individuals outside the company?

W: No, we develop our material internally. We do receive ideas from outside individuals, and while we review them, most of the time we are not interested. That's the nice thing about having internal development of our programs; we don't have to start at ground zero each time. If a company has to rely on outside people submitting material, there isn't much security and it becomes a matter of hit or miss regarding the quality of the games. Right now we're working on 30 projects internally and are constantly attracting new people.

A: The ATARI seems the central machine around which the development of Synapse products for other machines revolves. Is that true?

W: Well, for right now, because most of what we're doing on the other machines are conversions of ATARI titles. Once we have similar products for all the machines we can begin evaluating each machine's unique capabilities and develop products accordingly.

A: From a manager's point of view, what looms out there as your biggest probable danger? Are you afraid of growing too fast?

W: No, I think we have managed to control our growth. We have not required any outside investors and we've been able to boot-strap ourselves on cash flow, even when that's been difficult. We have a very successful company. I think the biggest danger for a company our size is not perceiving how the role of management changes as the company grows. When you're small it's a matter of putting out fires and bottom-up management. After a certain point you have to start hiring for the future and going from the top down. Some people are good at certain jobs but not very good at management. We want to provide a certain amount of job satisfaction while getting the products out.

In terms of threats out there, there's obvious danger with the large companies that have big advertising budgets. We have a lot of advertising money scheduled. We're also looking at alliances so that we don't have to come up against companies like Thorne or CBS, which have megabucks to spend on advertising. We've been able to get both our product and our name out there.

The market is also significantly different from a VCS market. A company like ACTIVISION has 10 million units as a base, with one SKU for that particular machine. Here we have five computers with three different media for each computer, so that's 15 SKUs for each title. How do you manage that?

A: What's an SKU?

W: That's one unit, one product line.

A: So, because each computer can each have programs on cassette, diskette and ROM cartridge, you have three different SKUs for each title?

W: Right. So for someone getting into mass merchandising from the game machine experience it can be overwhelming. There's the TI, the VIC, the 64, the Apple, the ATARI 400/800, with three different media for each one; which means you have to carry 15 separate items for one title. It's exponential. It's crazy! That's why a lot of the mass merchandisers are going to rack jobbers like Andleman and Lieberman, Softsell or SKU. It's up to the rack jobbers to bring in their racks and service them because it's impossible for the manufacturer to know what to do. That's the really difficult transition.

A: What was Synapse's volume in 82?

W: Well, we're shipping somewhere between half a million and a million dollars worth of product each month.

A: Before we end this, let me ask some personal questions. How is Ihor doing? Are you having a lot of fun?

W: Oh, very much.

A: Are you a millionaire yet?

W: I don't know. I'd say I've got an investment in something that's really good. I'm not a millionaire at the bank but I've got the potential for making a very comfortable amount of money.

A: Was it ever a particular life goal of yours to be running a company of this size?

W: No, I don't do it for the money or because I wanted to run a company. I do it because it's fun to do. When it stops being fun I won't do it any more.

A: What are your plans when and if it stops being fun?

W: Two things. I want to write children's story books and I want to produce some more movies. Oh, yeah, and I'd also like to live in the South Pacific!

A: It sounds like you just might do that. Do you have a movie idea you're just dying to make?

W: There are a couple of scripts I've written.

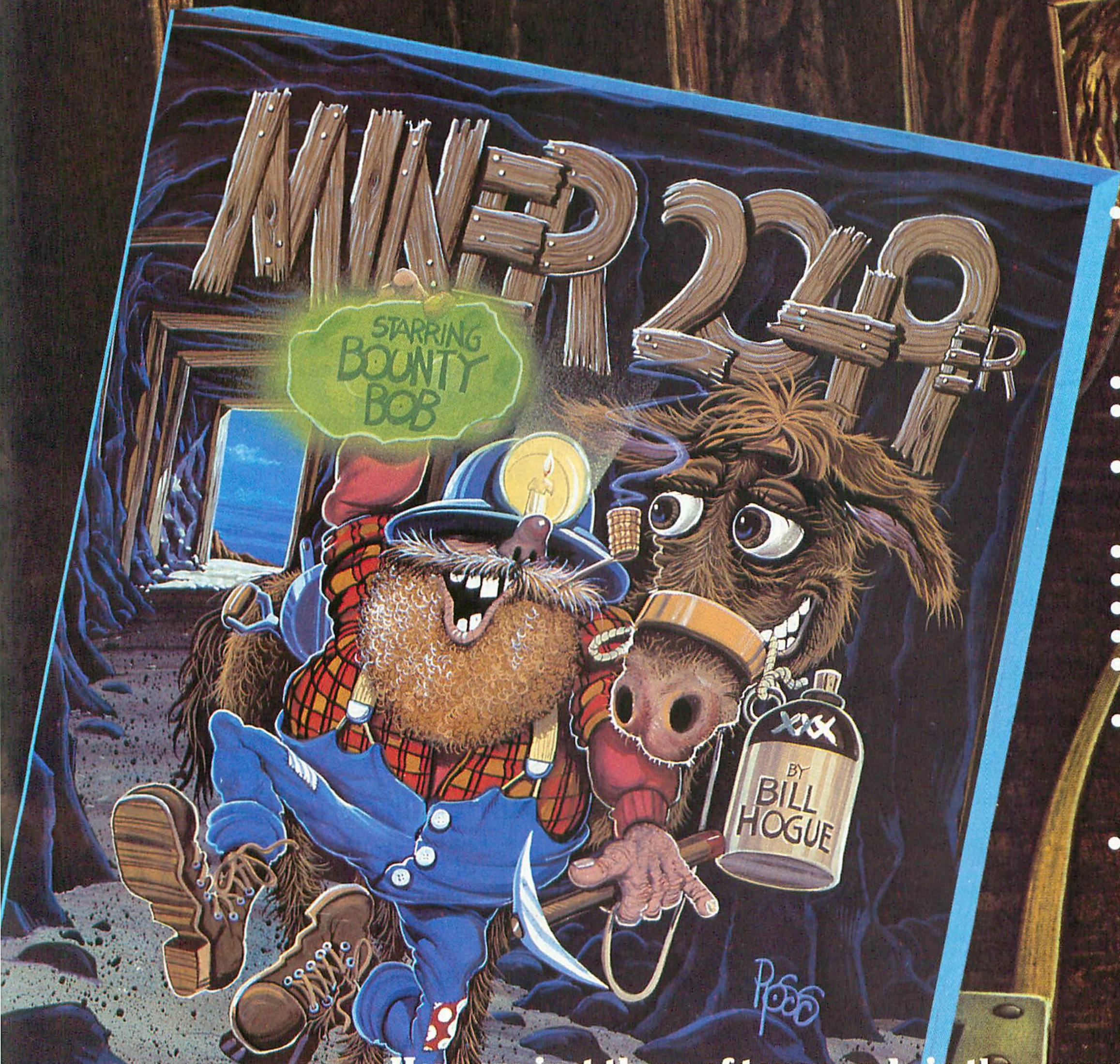
A: Are they fantasy scripts? Anything you'd like to share with us?

W: Not really. Not at this point.

A: Does Synapse have any plans for going into video production?

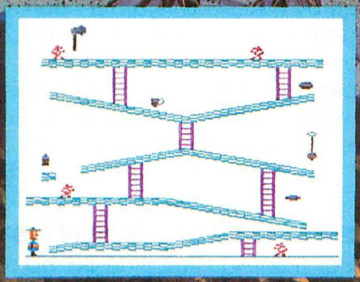
W: We're sticking with the computer although we are starting a business division which will handle the FileManager type of program. We have a TrendManager program ready to come out and we just released FileManager for the IBM-PC and we're currently working on some other business programs. As I said, my function is to design games and see to it that the company succeeds.

Stake a Claim on the most exciting New Game for your Atari Home Computer.

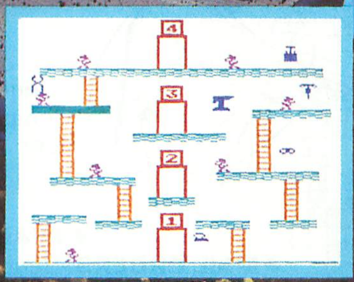


- From the programming team that brought you "Robot Attack", "Defense Command" and many other great Arcade games for your TRS-80™
- 100% machine language
- 16K ROM Cartridge, the largest available anywhere!
- Written specifically for the Atari® — not a converted Apple® game.
- Ten different rounds
- Difficulty adjustment
- High score table
- Demo mode
- Spectacular sound and graphics
- Runs on any 400/800 with at least 16K memory
- Only $49.95

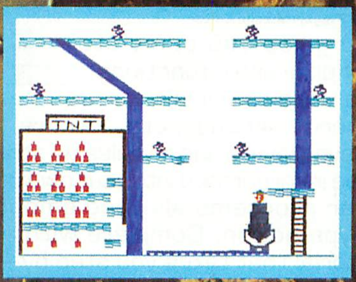
Here are just three of ten rounds in the game:



Round 1: The Mine Shaft.
Sharpen your miner's skill!



Round 3: The Transporters.
Beam yourself up!



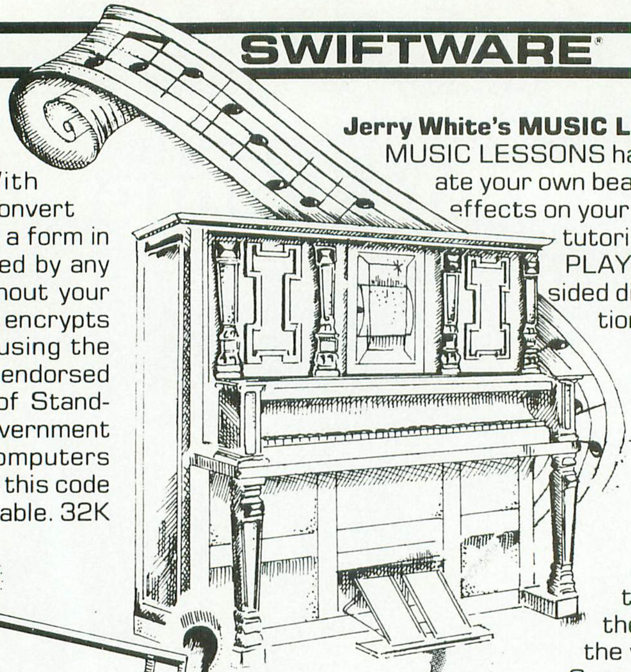
Round 10: The Cannon.
Shoot yourself to the top!

BIG FIVE SOFTWARE

P.O. Box 9078-185 · Van Nuys, CA 91409 · (213) 782-6861

To order, see your local dealer. If they do not have "Miner 2049er" then send a check or money order to us for $49.95 plus $2.00 for shipping and handling for immediate shipment! (California residents add 6½% sales tax.)

SWIFTWARE®



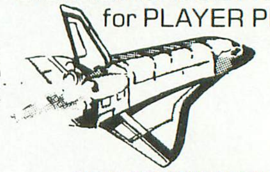
CRYPTO 800

Protect your valuable programs and data! With CRYPTO 800 you can convert your programs or data to a form in which they can not be used by any unauthorized parties without your secret key. CRYPTO 800 encrypts and decrypts your files using the data encryption standard endorsed by the National Bureau of Standards for use by many government agencies. The fastest computers would take years to break this code making it virtually uncrackable. 32K Disk. $39.95



Jerry White's MUSIC LESSONS

MUSIC LESSONS has everything you need to know to create your own beautiful music and a wide range of sound effects on your ATARI computer. This comprehensive tutorial contains 13 separate programs and PLAYER PIANO on 2 cassettes or 1 double sided disk and includes extensive documentation complete with program listings. 32K DISK 16K CASSETTE (24K required for PLAYER PIANO). $29.95

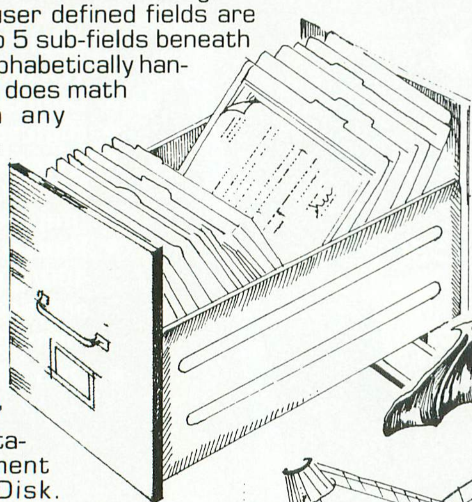


SPACE SHUTTLE by Paul Kindl

Join the crew of the *Space Shuttle* as they prepare to take the next step into the world of space travel. Take control of the world's first reuseable spaceship, the *Space Shuttle*, and in an accurate full graphic simulation, place yourself in the cockpit. Pilot the *Space Shuttle* through take-off with booster stage separations, orbit, descent down the glide path and landing to touchdown—complete with a chase plane and scrolling runway visible through the cockpit windscreen. You assume command throughout all phases of the mission aided by complete instrumentation. 32K Diskette. $29.95

FILE • IT 2 + by Jerry White

A powerful financial database management system. 6 user defined fields are created with up to 5 sub-fields beneath each main field. Alphabetically handles data and also does math computation on any selected fields. Data files are stored on separate disks with full field and subfield sorting with file merging. Supports up to 4 drives including the 128K Axlon Ramdisk. The "alternative" to more costly database management systems. 24K Disk. $49.95

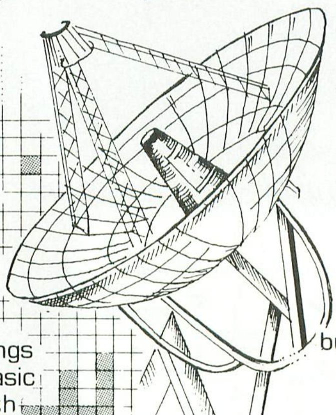




HAUNTED HILL by George Richardson

Fight bats and ghosts in the dark of the cemetery. This exciting, all machine language game has arcade quality graphics and speed. Requires Joystick.

$24.95 16K Cassette/$29.95 16K Disk.



P/M 800 by Fred Tedson

The ULTIMATE Player/Missile Editor

P/M 800 gives you complete control of all graphic functions: 5 players, colors, missiles, resolution, priority settings, etc. You create and save players and missiles as strings that can be incorporated into your own basic assembler programs allowing smooth arcade type action. Complete with a users tutorial that takes you step by step, exploring the fantastic graphic capabilities of the ATARI 400/800 computer. 32K Disk. $39.95

DATALINK by Tony Dobre

Top rated by national magazine reviews, purchased by NASA, this ultra-sophisticated menu-driven multioption smart terminal communications package supports uploading/downloading in full-duplex or simplex modes. Compatible with all the commercial services and bulletin boards such as the Source and Compuserve, etc. 24K Disk. $39.95

• AVAILABLE AT SELECT COMPUTER STORES

• MAIL ORDERS: Send check or money order plus $2.50 shipping and handling. N.Y. Residents add 7¼% sales tax.

• TELEPHONE ORDERS: (516) 549-9141

Send for FREE Catalog • Dealer Inquires Invited

SWIFTY SOFTWARE, INC.
64 Broad Hollow Road
Melville, New York 11747

MasterCard — VISA

VOYEUR

The Case of the Homely Cousin

by MARK GRICE

My students in BASIC programming often ask, "Why do some programmers *love* to use POKEs and PEEKs?"

It is a valid question, especially considering the ATARI computer. Why use a POKE for your color instead of SETCOLOR? It seems to be unnecessary work. It is not, however. There are several good reasons why a programmer might use POKEs and PEEKs.

To understand the whys and wherefores, let us consider memory. Memory is a lot like money: first, you can never have enough . . . second, it is hard to come buy . . . and third, it is wise to use it sparingly . . . and last, the more you have, the more you want!

The sad truth, friends, is that SETCOLOR and SOUND commands eat up memory. Why? Well, let's look at the BASIC process . . .

First, it is important to understand that BASIC is NOT a compiler, it is an interpreter. Your computer, like all computers, understands only one language . . . machine language. That's it. Period. It is quite incapable of ever learning any other language. The unfortunate part of all this is that humans are not well-equipped to work with machine language. And so we have a stalemate.

Enter the interpreter, in our case, named BASIC. A wonderful person, our interpreter, he understands machine language perfectly; and he *almost* understands English. At least he understands enough so that it is possible to talk to him if we learn BASIC's language. Then, away we go, we give BASIC a command, he breaks it down into machine-language commands, hands it to the computer, the computer rushes about to do its duty, tells BASIC the result, and BASIC relays the progress report to the programmer. Stupendous! But slow.

Where is all of this leading? You guessed it, POKE and PEEK use less memory, and execute faster than do SETCOLOR and SOUND, etc. Ergo, the first reason for using POKE and PEEK is that it is faster. The second is that it requires less memory. And the third . . . because there are times when there is simply no other choice . . .

I like to think of my computer as being a lot like me. I have a notorious reputation for being absent minded. In fact, as I sit here writing, I see that the biggest item in the room is my "external memory board," a 4′ × 6′ White Marker Board that I jot reminders on. Whenever someone calls be about something, I write it on my memory board. Then, religiously before I leave at night, I look at the memory board to see what I'm forgetting.

Let's take a fantastic example. I am hard at work, and the phone rings. I answer, and on the phone is the sexy voice of this gorgeous girl I met at a computer convention. She is in town at a hotel, and asks me if I could get away and meet her somewhere. Naturally, I

continued on page 29



tell her that I am busy at the moment, but that I will get away when I can. She gives me her hotel's name, and her room number, and hangs up.

Immediately, I go to the white board, and jot down the information. Just then, I hear my door buzzer. I go to the door and find the UPS man there. While I am busy, my brother sneaks into the room behind me, goes to the white board, and *changes* the precious information that I had put there.

At the end of the day, I turn off my computer (a smile playing about my lips), look at the white board and get the information: Holiday Inn; room 234. Of course when I get there, I find not my lovely out-of-town visitor, but rather my sister-in-law's homely cousin that she has been trying to fix me up with for the last eight months!

This rather bizarre example is similar to what happens when the computer first boots up. The term "Boot" is derived from the phrase "Pulling yourself up by your own bootstrap". When it first boots up, the computer stores certain values in parts of its external memory board, much the same as I write important information on my white board. As it goes about its duty, it will look into these "memory locations" and get the information that it needs. For example, 60 times each second, it looks into memory location 710, takes the value it finds there and produces a color for the background in Graphics Mode 0. Suppose you are in a program, and the screen is black with white letters. You know that the area in memory that the computer refers to to get the color for this screen is location 710. So what's the numerical value that is equivalent to black? Take a PEEK. It is done like this:

```
PRINT PEEK (710)
```

The computer will now look into location 710, see what is there, and print the result. In our example, it will print a 0, since that is the value of black. There is something else rather nifty about this . . . you don't *ever* have to know what the value of a location is in order to use it.

Suppose you did this:

```
A = PEEK(710)
```

What good does that do? Well, now you can keep the value for future reference, so that we can restore the original value back to the location when we are done playing around. More on that later.

Okay, so the PEEK command is the "voyeur" of the computer world. What is POKE?

In my example of the sexy out-of-town visitor, the part of POKE was played by my brother. POKE is the wise-guy who sneaks in when the computer is not looking and changes the value. Turn on your computer, and notice the screen. It is blue. Type in:

```
POKE 710,0
```

No doubt all of you scholars out there knew that the screen was going to change to black. Those of you who didn't, take heed. When you type in a POKE command, you are telling the memory (in your best Edgar G. Robinson voice) "All right, you listen, and listen good. I don't care WHAT value WAS in that location, now it's a 0, seee, and if you don't like it . . . tough!"

In less extravagant terms, you are taking a value of 0 and POKING it into that location, thus changing it. When the computer checks that location it grabs the new value and acts accordingly. You may wonder why the computer neither knows, nor cares, what values are stored. It is too busy carrying out its instructions to be bothered (except for hardware registers and their shadows, which we will ignore for the moment).

What happens if I POKE a value there that shouldn't be there? Maybe nothing, or maybe you'll have one *very* confused little computer.

What happens if I POKE something into a location that the computer never checks? Nothing. Nothing at all. That is why, although you have 48,000 bytes of RAM, you only have a couple hundred memory locations that do anything. All that matters is what the Operating System and company check regularly. To use the previous example, if my brother had changed the information on a scrap of paper that I never bothered to look at, his practical joke wouldn't have succeeded.

Enough of theory. Let's try some examples.

```
FOR X = 1 TO 125: POKE 710,X:
NEXT X
```

I am assuming that we all know what a FOR-NEXT loop is and what it does. This little ditty changes the value in location 710 one hundred and twenty-five times, and, I might add, it does it Pretty Darn Quick.

Remember what I said about storing a value without looking at it and using it later? The time has come to explain that. Hit [SYSTEM RESET] and try this:

```
10 A = PEEK (710)
20 FOR X = 1 to 125: POKE 710,X:
   NEXT X
30 POKE 710,A
```

This I call the "Brings Us Back To Doe" program. Notice what happens . . . We peek into location 710, and store that value in what we call A. Then we change the value of location 710, (and hence the color of the screen) one hundred twenty-five times, and when we're finished, we have the decency and foresight to put everything back the way we found it.

I have been asked in my classes, "Why doesn't the value of A change when the value of 710 changes?" Because, we are setting A up before, not during, the change. Let us say that there is a 0 in location 710. In line 10, we say, A is equal to whatever is in 710. So the computer says, "Oh, A is equal to 0." THEN we change the value in location 710. **But we never go back and change the value of A. It remains the same.** Understand, PEEK is not a dynamic process. It does not continue to happen once you call for it. It only happens when you tell it to.

I understand that this is not the most accurate dissertation on POKEs and PEEKs, but I hope that it may have helped some of you understand it better.

STAR AWARD WINNER

Seventeen-year-old David Buehler of St. Paul, Minnesota, has been awarded Atari, Inc.'s $25,000 Star Award for writing the best program of 1982 on his ATARI Home Computer. The high school junior won the first-place cash prize for his program called **Typo Attack**, a fast-paced educational game for learning the location of keys on the keyboard.

The Star Award is an annual prize given to the author of a home computer program judged the most outstanding entry in the Atari Program Exchange (APX) contest. APX awards $100,000 annually in ATARI products and cash for winning home computer programs, including the $25,000 grand prize given to the author of the year's best program.

The object of the game is to prevent animated letters from descending — in successively faster order — to the bottom of the screen and destroying "bases." The only way to stop them is to type the correct letter on the keyboard.

Twelve prize-winning programs vied for the Star Award in 1982. The choices were narrowed to four finalists, and the remaining three received Awards of Merit. They are:

Lee Actor of San Jose, California, created **Advanced MusicSystem**, a program to create and listen to music and modify it at will. A former professional concert violinist and composer, Actor originally wrote this program to create and store his personal works.

Douglas Crockford of Sunnyvale, California, designed **Galahad and the Holy Grail**, a computer game that allows players to become Knights of the Round Table and overcome a variety of obstacles. Crockford is now a game designer for Atari.



Star Award Winner, *David Buehler, demonstrates his winning program,* **Typo Attack**, *at the Awards luncheon in New York last January.*

Harry Koons and Art Prag of Los Angeles designed **Astrology**, a program which will prepare detailed astrological charts for the user, based on time and place of birth.

All entries accepted by the Atari Program Exchange are published in the quarterly APX Catlog and remain the property of their developers. Atari pays a royalty for each sale made.

Atari Information Center
(408) 745-4636

Customer Service, toll free,
inside California
(800) 672-1404

outside California
(800) 538-8543

GAME MACHINE GROWS UP

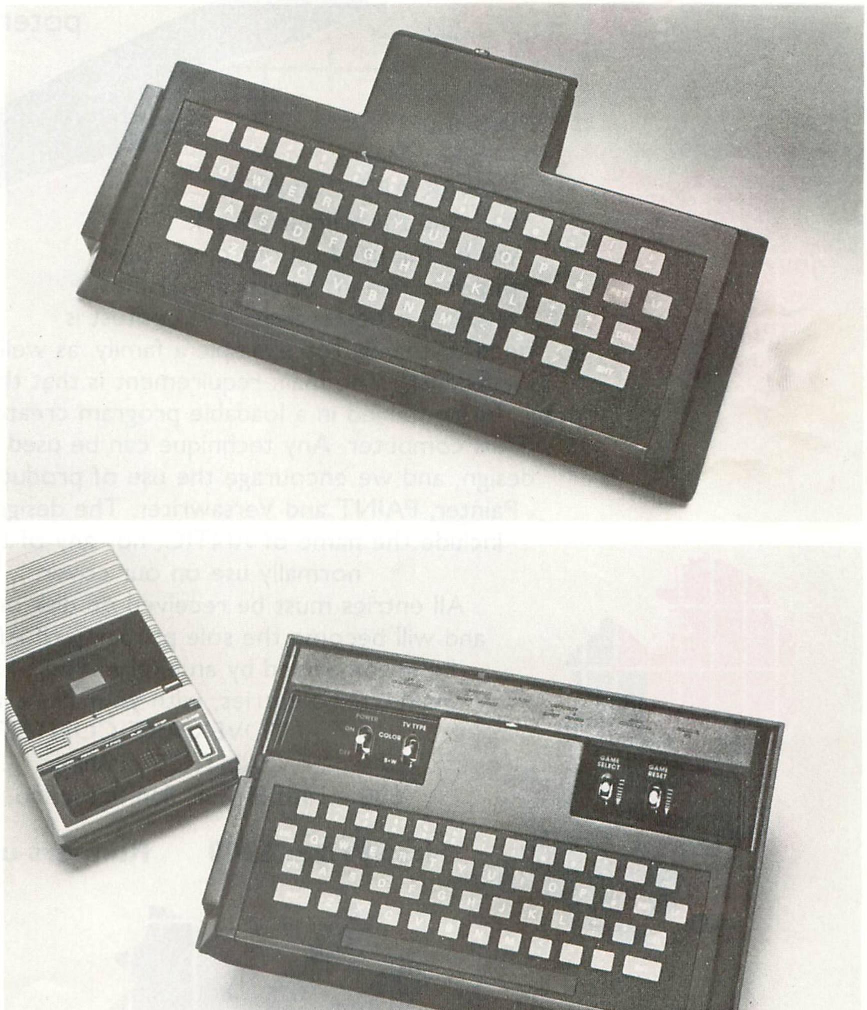
Keyboard converts VCS to Computer

The turbulent whirl of electronic development has offered up a new and welcome addition to the Atari product line — a low-cost, plug-in keyboard that converts the popular Atari VCS 2600 game machine into a programmable computer. A similar adaptor for the 5200 game machine will be announced later this year.

Called **My First Computer**, the keyboard will have 8K RAM (expandable to 32K), built-in BASIC, raised "button" keys, and an expansion port for peripherals such as printers and disk drives. It will display on color TV sets just as the VCS did. It snaps onto the VCS in minutes, and requires no prior knowledge of programming or computers by its user.

Once connected to the VCS, the unit will accept standard VCS game cartridges as well as a new library of software titles with emphasis on home management, education and personal development. Mass storage for My First Computer is immediately available using a standard portable cassette tape recorder, according to company sources. The system is also designed to work with a modem for telecommunication.

There are ten million VCS units already sold, and many of their owners are expected to buy a computer in the next few years. My First Computer, retailing at less than $90, will allow them to do this inexpensively and still retain the values of their game libraries. New games for this system — with enhanced graphics made possible by the additional memory — are in preparation.



My First Computer, *an easily-installed, plug-in keyboard converts the Atari 2600 video game player into a programmable 8K computer. Lower photo shows unit installed on VCS. A standard cassette tape player can be used for external memory.*

The first production models are expected to be available by late 1983, by which time much of the new software will have been developed. Standard game controllers will continue to be used.

ANTIC plans to cover this new hybrid, as well as its sibling, the 5200 Advanced Game System, announced last month. One way or another, they are all ATARI computers, and ANTIC *is* the ATARI Resource.

—Robert DeWitt

Antic™

COVER CONTEST

ANTIC has something special for all of you who love to explore the graphics potential of your machines.

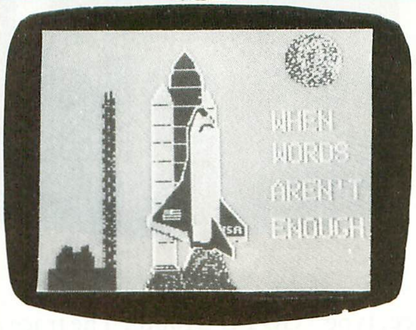
We are sponsoring a COVER ART CONTEST, and the winner's work will be featured on our cover later this year. An inside article will show selected other entries. The contest is open to teams, for example a family, as well as individuals. The main requirement is that the design be contained in a loadable program created with the ATARI computer. Any technique can be used to make the design, and we encourage the use of products such as Micro-Painter, PAINT and Versawriter. The design should *not* include the name of ANTIC, nor any of the other words we normally use on our cover.

All entries must be received on disk or tape by June 15, 1983, and will become the sole property of ANTIC. Entries should be accompanied by an explanation of how the designs were made. Send entries, with your name and address, to

COVER ART CONTEST
ANTIC Publishing,
600 - 18th Street, San Francisco, CA 94107.

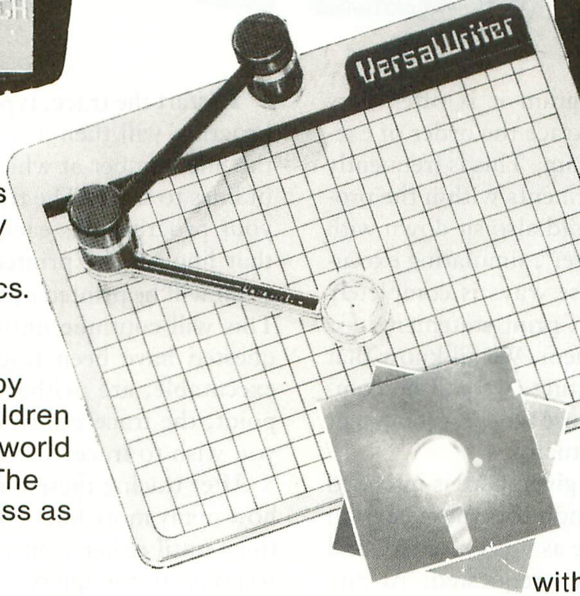
First Prize: $300 **Runners-up: Software Prizes**

VersaWriter



WHEN WORDS AREN'T ENOUGH . . .



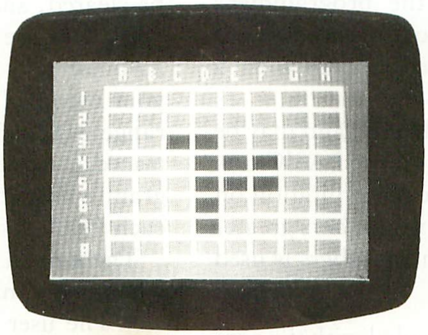


Teachers, artists, engineers, programmers & hobbiests find VersaWriter an easy to use tool for creating micro computer graphics. No programming experience is required. Pictures can be made by simply tracing. Even children can explore the exciting world of computer graphics. The Versawriter is as limitless as your imagination.

VersaWriter contains complete software for drawing with color and brushes. Add text or fill in over 60 colors. Create your own shapes & place anywhere on the screen. Use Hi-res or Medium-res drawing, save pictures to disk, and dump to MX80 with Graftrax. Complete hardware/ software system for Atari with 40K RAM Memory - $299.00

VERSAWARE for ATARI







GRAPHICS COMPOSER
$39.95

Complete graphics software allows you to draw with paddles or joystick on Hi-res or Medium-res screen. Use color Fill-in, Brush or Text modes to complete graphic designs. Create player/missile shapes automatically. Contains geometric figures program, Save function, plus much more. Requires: Atari 800, 32K RAM, Basic Language Cartridge, Disk.

MIND BOGGLERS
$19.95 Disk $15.95 Cass.

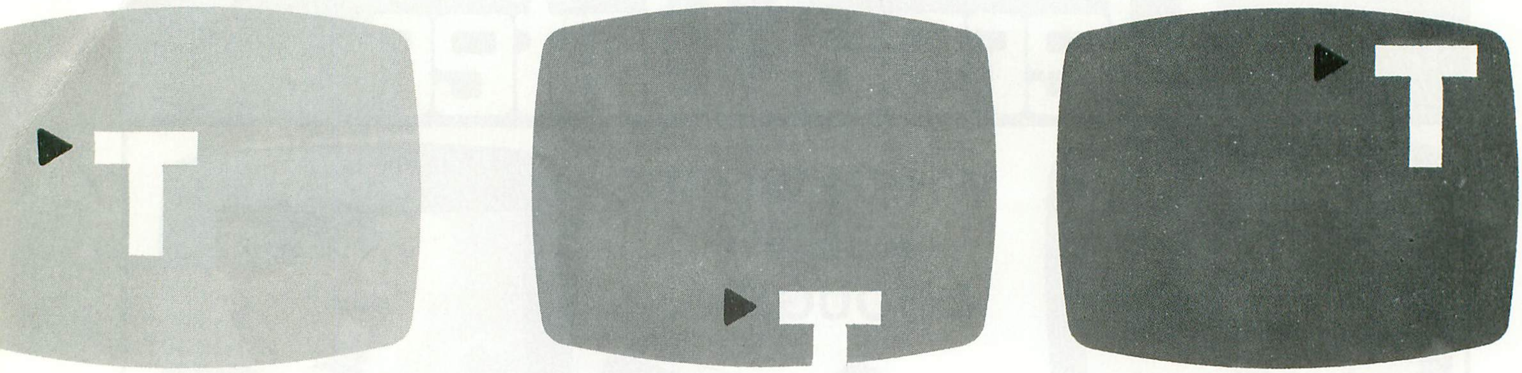
Mind Bogglers contains three games designed to challenge reasoning, strategy, deduction and memory. Capture, based on the popular game Othello™, is a battle for control of the board. Find hidden atoms by shooting rays into the Mystery Box. Simon Says is a memory teaser using numbers and sound. All games offer varying degrees of skill level. Requires: Atari, 16K RAM (cassette), 24K RAM (disk).

GLOBE MASTER
$29.95

Test your geography skills with Globe Master. Eight high resolution maps offer drill on states, capitals, countries, continents, oceans, etc. A challenging educational program which offers four skill levels and user friendly software options reducing the importance of exact spelling. Contains two disks. Requires: Atari 800, 32K RAM, Basic Language Cartridge, disk.

VERSA COMPUTING, INC.

(805) 498-1956
3541 Old Conejo Rd. #104/Newbury Park, CA 91320



When debugging a BASIC program it is often very valuable to have some way to trace the order of execution of statements within the program. This is frequently done by inserting "debug" print statements within the program and later deleting them. We could also sit down with the program listing and "play computer", simulating execution of the program. Neither of these ways is completely satisfactory. It is a nuisance to insert print statements for debugging and later have to delete them. We all know that when trying to follow a program listing, we can be completely blind to an obvious error because we see a statement as it "should be" rather than as it actually is.

The BASIC Trace Utility program given here is intended to be an aid in situations like this. It monitors the execution of your program, displaying each line as it is executed, and can display values of variables when requested. At any time, you may halt the execution, modify or display other variables, and then resume execution where you left off. This utility may be used to determine where a variable takes on an erroneous value or at what point the program takes an execution path contrary to the programmer's intention. In addition, the beginning programmer can use the trace utility to better understand what happens when a BASIC program executes.

The BASIC Trace Utility is written in BASIC and may be run on any ATARI 400 or 800 system with the BASIC cartridge and at least 16K RAM. The principal limitation on the user program is that it may not use line numbers greater than 30999, since this upper range of line numbers is used for the trace utility program.

To use the program, it must first be loaded with the program you want to debug. In order to do this conveniently, the trace utility program should have been stored on disk in source form using the command "LIST D1: TRACE.LST" (rather than the SAVE command) and should be merged with your loaded program using the command "ENTER D1:TRACE.LST" (rather than the LOAD command).

Alan Filipski responded to our challenge to develop a trace routine (see ANTIC #4, page 6) and is the winner of that contest. His prize is a copy of Basic A+, by Optimized Systems Software. His program and explanatory article is published for the benefit of all of us.

To start the trace, type "GOTO 31000". The trace utility program will then ask you for the following information: the line number at which to begin tracing, and the number of lines to trace. The trace utility will then begin to execute your program. As each line of your program is executed, that line will be printed out. Any output from your program will be printed out interspersed with this trace listing. This will continue until the number of lines you have requested have been traced. (DATA statements, not being executable, are neither printed out nor counted.) At that point, the trace utility will aks you how many more lines you wish to trace.

After tracing these lines, the program will again ask you how many more lines you wish to trace. This cycle will continue until either your program ends or you enter a "0" in response to the query. At this point, control is returned to the immediate mode. If you wish, you may now print out or modify variables, GOTO 31000 and restart the trace, either at the beginning, or at the line where your previous trace left off. If you start at the beginning, all variables will be cleared, and arrays and strings will be deallocated.

If there are any variables which you want printed out automatically at every step of the trace, you may insert your own PRINT statements anywhere in the line-number range 31122–31126. These PRINT statements will not be traced, but will be executed before each line of the user program is executed. To produce a more compact display, end each PRINT statement with a semicolon.

There are a few cautions and limitations to be observed when using this program:

- The user program should not contain any TRAP or CLR statements.
- If the user program terminates by executing a STOP or END which is not the first statement of the line in which it appears, for example:

  910 PRINT "NORMAL TERMINATION" : END

  or

  910 INPUT A : IF A=0 THEN STOP

  then the user program will be seen to contain some garbage when it is listed. If this happens, re-enter the trace utility by typing GOTO 31000, and exit by requesting 0 lines to be traced. This minor nuisance cannot be reasonably repaired within the framework of the existing design of the trace utility.

TRACE UTILITY

by ALAN FILIPSKI

- It is wise to maintain a backup copy on disk of any program being traced (or just being run).
- The trace utility program uses some BASIC variable names, all of which begin with "DBG". Avoid using variable names in your program which start with this sequence of characters.
- As mentioned before, the program being traced should not use any line numbers greater than 30999.
- Do not expect the traced program to run as fast as the original program.

How does the BASIC Trace Utility program work? Since BASIC is an interpreted language, the simplest and most straightforward way to produce a trace utility would be to modify the interpreter. In the case of ATARI BASIC however, this alternative is not available, since the interpreter is in a ROM cartridge. The approach taken here is more similar to the approach that might be taken to trace a compiled language and involves setting trappable errors in each line of the user program, and then listing the line when the error trap is taken. This is admittedly a kludge, but I could not think of a better way to do it.

This is what happens when the user types in "GO TO 31000": The program first sets a TRAP so that any execution error causes control to go to statement 31046. Then the first command token in each line of the user program (except DATA statements) is set to 55, meaning "syntax error" to the ATARI BASIC interpreter. The real command token is stored by adding it into the "end-of-line" token for that line so that it may be retrieved later. The program then transfers control to the line number input by the user. Since the first statement of this line contains an error, control passes to 31046. This portion of the Trace Utility program re-introduces any errors which were cleared on a previous cycle, clears the error in the line which caused the trap, and LISTs this line. The line containing the most recently executed FOR or GOSUB statement, if any, is also cleared of its error. This is necessary, because whenever the interpreter encounters a NEXT or RETURN, it checks to see whether the corresponding FOR or GOSUB is still there. Control is now transferred to the (now corrected) statement which caused the error trap and the statement is executed. When control passes from this line to any other line, however, an error trap is taken and the cycle repeats. When the user indicates that he is done by entering a "0", errors are removed from all lines and the program stops.

The fact that this program was written in BASIC has several advantages. First, it is compact, consisting of less than 90 lines of executable code with only 12 variables. The primary advantage, however, is that it may be readily modified by the user. For example, if it were desired to print only the line number of the statement being traced and not the entire statement, it is only necessary to change line 31130 to

```
31130 ? PEEK(DBGPTR)+256*PEEK
      (DBGPTR+1);" ";
```

This ability to easily modify the source gives the user quite a bit of flexibility once he understands the code. Understanding the source code may take some work because of the high density of PEEK$ and POKE$ and the lack of such niceties as WHILE loops and indentation in ATARI BASIC. To aid understanding, here is a description of variables used in the program:

DBGCOM — Variable used to store the command token of a BASIC statement.

DBGEOL — Variable used to store the end-of-line token of a BASIC statement.

DBGLN1 / DBGLN2 — used to hold two-byte line number of a statement which triggered trap.

DBGPTR — Pointer to beginning of current statement; used in a loop to search for a particular line number.

DBGSAVE — A temporary holder for the value of DBGPTR.

DBGSAV1 — Statement-table offset of most recently executed FOR or GOSUB statement.

DBGSAV2 — Statement-table offset of statement most recently cleared for execution.

DBGST — Address of beginning of BASIC statement table.

DBGSTART — Line number at which trace execution is to start.

DBGTC — Count of number of lines left to trace.

DBGTOP — Address of top of BASIC run-time stack.

A further explanation of these concepts may be found in the book *De Re ATARI*.

continued on page 37



Writing this program was very instructive and required some experimentation to discover undocumented details of the BASIC interpreter. Given the limitations described above, it provides a useful utility for debugging programs written in ATARI BASIC.

RAM REQUIREMENTS
TRACE 3K + traced program

```
31000 TRAP 31046
31002 REM
31004 REM BASIC TRACE UTILITY
31006 REM ALAN FILIPSKI 1982
31008 REM
31010 REM FIND START
      OF STMNT TABLE
31012 DBGST=PEEK(136)+
      256*PEEK(137)
31014 REM SET ERR
      IN EACH STMNT
31016 GOSUB 31152
31018 ? " ":? "BASIC
      TRACE UTILITY":? " "
31020 ? "ENTER LINE NUMBER
      AT WHICH"
31022 ? "EXECUTION IS
      TO START"
31024 ? "(FIRST LINE IN PROG IS
      ";PEEK(DBGST)+
      256*PEEK(DBGST+1);")"
31026 INPUT DBGSTART
31028 REM CLR ARRAYS IF STARTING
      AT FIRST STATEMENT
31030 IF DBGSTART<>PEEK
      (DBGST)+256*PEEK
      (DBGST+1) THEN 31038
31032 CLR :DBGST=PEEK
      (136)+256*PEEK(137)
31034 REM RESTORE DBGSTART
31036 DBGSTART=PEEK
      (DBGST)+256*PEEK
      (DBGST+1)
31038 ? "HOW MANY LINES TO TRACE
      ":INPUT DBGTC
31040 IF DBGTC<=0 THEN 31064
31042 GOTO DBGSTART
31044 REM TRAP HERE AT
      EACH ERROR ENCOUNTERED
31046 DBGST=PEEK
      (136)+256*PEEK(137)
31048 IF PEEK(195)=17 THEN 31054
31050 REM UNEXPECTED ERROR TYPE
31052 ? "ERR TYPE ";PEEK
      (195);" AT LINE ";PEEK
      (186)+256*PEEK
      (187):GOTO 31064
31054 IF DBGTC>0 THEN 31072
31056 ? "HOW MANY MORE ";
31058 INPUT DBGTC
31060 IF DBGTC>0 THEN 31072
31062 REM TIME TO
      QUIT.  REMOVE ERRS
31064 GOSUB 31212
31066 ? "TRACE ABORTED"
31068 STOP
31070 REM REINTRODUCE ERR INTO CLEARED
      "FOR" OR "GOSUB"
31072 IF DBGSAV1=0 THEN 31086
31074 DBGSAV1=DBGSAV1+DBGST:IF PEEK
      (DBGSAV1+4)=55 THEN 31086
31076 DBGEOL=DBGSAV1+PEEK
      (DBGSAV1+2)-1
31078 DBGCOM=DBGSAV1+4
31080 POKE DBGEOL,PEEK
      (DBGEOL)+PEEK
      (DBGCOM)
31082 POKE DBGCOM,55
31084 REM REINTRODUCE ERR INTO
      LAST STATEMENT EXECUTED
31086 DBGSAV2=DBGSAV2+DBGST:
      IF PEEK(DBGSAV2+4)
      =55 THEN 31098
31088 DBGEOL=DBGSAV2+PEEK
      (DBGSAV2+2)-1
31090 DBGCOM=DBGSAV2+4
31092 POKE DBGEOL,PEEK
      (DBGEOL)+PEEK
      (DBGCOM)
31094 POKE DBGCOM,55
31096 REM CLEAR ERR FROM "FOR" OR
      "GOSUB" ON TOP OF RUNSTK
31098 DBGSAV1=0
31100 IF PEEK(142)=PEEK
      (144) AND PEEK
      (143)=PEEK
      (145) THEN 31114
31102 DBGTOP=PEEK(144)
      +256*PEEK(145)
31104 DBGLN1=PEEK(DBGTOP-3)
31106 DBGLN2=PEEK(DBGTOP-2)
31108 GOSUB 31176
31110 DBGSAV1=DBGPTR-DBGST
31112 REM FIND STATEMENT WHICH
      TRIGGERED TRAP AND CLEAR ERR
31114 DBGLN1=PEEK(186)
31116 DBGLN2=PEEK(187)
31118 GOSUB 31176
31120 DBGSAV2=DBGPTR-DBGST
31122 REM *******
      **********
      **********
31124 REM INSERT USER PRINT
      STATEMENTS HERE
31126 REM ******
      **********
      ***********
31128 REM LIST TRAPPED STMNT
31130 LIST PEEK(DBGPTR)+256*PEEK
      (DBGPTR+1)
31132 TRAP 40000:TRAP 31046
31134 DBGTC=DBGTC-1
```

continued on next page

```
31136 REM IF STMNT IS END OR STOP,
      CLEAR ALL STATEMENTS
31138 IF PEEK(DBGPTR+4)=21 OR PEEK
      (DBGPTR+4)=38 THEN GOSUB 31212
31140 REM EXECUTE STATEMENT
31142 GOTO PEEK(DBGPTR)+PEEK
      (DBGPTR+1)*256
31144 REM
31146 REM SUB TO SET ERRS
31148 REM SET COMMAND TOKEN
      IN ALL USER STATEMENTS
      (EXCEPT DATA STATEMENTS)
       TO 55
      (=ERROR)
31150 REM SAVE ORIGINAL USER
      COMMAND BY ADDING TO
      END-OF-LINE BYTE
31152 DBGPTR=DBGST
31154 IF PEEK(DBGPTR+4)
      =55 OR PEEK(DBGPTR+4)
      =1 THEN 31164
31156 DBGEOL=DBGPTR+PEEK
      (DBGPTR+2)-1
      31158 DBGCOM=DBGPTR+4
      31160 POKE DBGEOL,PEEK(DBGEOL)
            +PEEK(DBGCOM)
31162 POKE DBGCOM,55
31164 DBGPTR=DBGPTR+PEEK(DBGPTR+2)
31166 IF PEEK(DBGPTR)
      +256*PEEK(DBGPTR+1)
      <31000 THEN 31154
31168 RETURN
31170 REM
31172 REM SUBROUTINE TO FIND STMNT
      AND REMOVE ERR.
        2-BYTE LINE NO. EXPECTED IN
      DBGLN1 AND DBGLN2.
31174 REM PTR TO LINE
      IS RETURNED IN
      DBGPTR.
31176 DBGPTR=DBGST
31178 IF DBGLN1=PEEK(DBGPTR) AND
      DBGLN2=PEEK(DBGPTR+1) THEN 31186
31180 DBGPTR=DBGPTR+PEEK(DBGPTR+2)
31182 GOTO 31178
31184 REM REMOVE ERR
31186 IF PEEK(DBGPTR+4)
      <>55 THEN RETURN
31188 DBGEOL=DBGPTR+PEEK
      (DBGPTR+2)-1
31190 DBGCOM=DBGPTR+4
31192 IF PEEK(DBGEOL)>100 THEN 31200
31194 POKE DBGCOM,PEEK(DBGEOL)-22
31196 POKE DBGEOL,22
31198 RETURN
31200 POKE DBGCOM,PEEK(DBGEOL)-155
31202 POKE DBGEOL,155
31204 RETURN
31206 REM
31208 REM SUBROUTINE TO
      CLEAR ALL ERRORS
31210 REM
31212 DBGSAVE=DBGPTR:DBGPTR=DBGST
31214 IF PEEK(DBGPTR+4)
      <>55 THEN 31228
31216 DBGEOL=DBGPTR+PEEK
      (DBGPTR+2)
      -1:DBGCOM=DBGPTR+4
31218 IF PEEK(DBGEOL)>100 THEN 31226
31220 REM NON-REM LINE HAS 22 FOR EOL
31222 POKE DBGCOM,PEEK(DBGEOL)
      -22:POKE DBGEOL,22:GOTO 31228
31224 REM REM LINE HAS 155 FOR EOL
31226 POKE DBGCOM,PEEK(DBGEOL)
      -155:POKE DBGEOL,155
31228 DBGPTR=DBGPTR+PEEK(DBGPTR+2)
31230 IF PEEK(DBGPTR)+256*PEEK(DBGPTR+1)
      <31000 THEN 31214
31232 DBGPTR=DBGSAVE
31234 RETURN
```

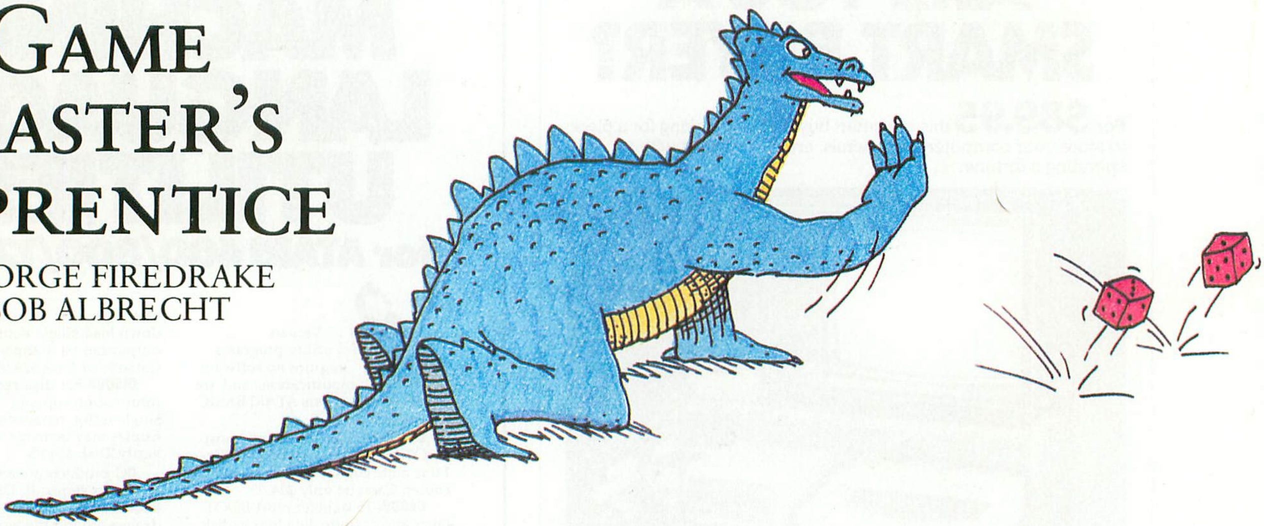
TYPO TABLE

Variable checksum = 563072

Line num range	Code	Length
31000 – 31022	HX	284
31024 – 31046	OC	395
31048 – 31070	DO	337
31072 – 31094	WK	315
31096 – 31118	KN	331
31120 – 31142	VX	373
31144 – 31166	MT	387
31168 – 31190	JK	317
31192 – 31214	BO	205
31216 – 31234	FY	291

Game Master's Apprentice

by GEORGE FIREDRAKE
& BOB ALBRECHT



Have you heard of *Dungeons and Dragons, Runequest, Tunnels and Trolls* or *Worlds of Wonder*? These are fantasy role-playing games. For information, write to the following publishers.

Dungeons and Dragons (D&D) from TSR Hobbies, P.O. Box 756, Lake Geneva, WI 53147.

Runequest (RQ) and *Worlds of Wonder* from Chaosium, P.O. Box 6302, Albany, CA 94706.

Tunnels and Trolls (T&T) from Flying Buffalo, Inc. P.O. Box 1467, Scottsdale, AZ 85252.

To play any of these games, you must create one or more characters, then guide your character(s) through adventures in a universe created by a game master. To create a character, you will roll three six-sided dice several times. We will use Runequest as an example.

A Runequest character has seven characteristics: strength (STR), constitution (CON), size (SIZ), intelligence (INT), power (POW), dexterity (DEX), and charisma (CHA).

These characteristics determine a character's ability to use weapons, fight, learn and use magic, sustain damage, solve problems, lead others, and so on.

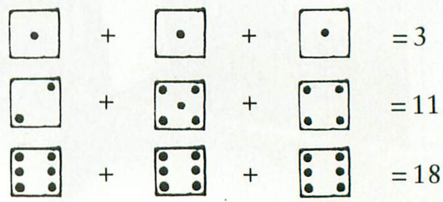
> **DragonSmoke** *poses problems for you to answer, programs for you to write, and whatever other mischief we might cunningly contrive. As time goes on, and as issue follows issue, we will answer some of the problems we create. Better yet, you answer.*

Each characteristic is determined by rolling three six-sided dice. Or, in the jargon of role-playing games, you roll 3D6.

3D6 

When you roll 3D6, you get a number in the range, 3 to 18.

For example:



We wrote a program to roll and display the seven basic characteristics for a Runequest character. Here is the first run of our program.

```
STR  17  We call him Barostan.
CON  17  He is big and strong,
SIZ  13  but not too bright. He
INT   8  is good to have on your
POW   7  side in a fight, if someone
DEX  15  will tell him who to hit.
CHA   6  He acts first, then thinks later, if at all.

TO DO AGAIN,
PRESS SPACE BAR
```

We record the information on the screen on a sheet of paper, then press the space bar. The computer immediately rolls another character, whom we name Joleen.

```
STR  13  Joleen is a clown, mime, acrobat,
CON  11  dancer, or whatever else might
SIZ   7  entertain an audience. She wants
INT  13  to travel with a troupe of
POW   8  wandering entertainers, and perform
DEX  17  at fairs and festivals. She will
CHA  13  charm you.

TO DO AGAIN, PRESS SPACE BAR
```

continued on page 44

Slaying Monsters Is No Game

Role-playing games are a serious business. They require thought and strategy, skill and luck. But the programmers of computer role-playing games haven't taken them seriously enough. Until now. Now **ScreenPlay™** does role-playing right — the Warrior of RAS™ series.

Each volume of the Warrior of RAS™ series is completely different from the others. *Dunzhin* leaves you in a multi-level maze of rooms, full of traps, treasures, and dangerous monsters. Volume II, *Kaiv*, places your warrior in a cavern, complete with magic, bats, cave-ins, and dozens of objects to buy, collect and use to survive. Each Warrior of RAS™ game can generate millions of unpredictable games. Not just data bases, but new mazes. New caverns. New challenges.



There are some things our games lack. Like endless I/O delays while the computer digs up information. Or hours spent poring over rule books trying to figure out how to play the game. Or boring pauses while the computer tries to figure out what to do next. The Warrior of RAS™ games are fully implemented in machine language, with lightning-speed "from-above" graphics. They're fast, powerful, and easy to use. Even if you have never played a role-playing game before.

Since a Warrior of RAS™ exploration may last many days, games can be saved directly onto your tape or disk. And the characters you develop can also be saved, and can be loaded into other Warrior of RAS™ games. The Warrior of RAS™ series was created by Randall Masteller, author of several non-computer role-playing games.

The Warrior of RAS™ series. Why settle for anything less?

ride the dragon.™

**The Warrior of RAS™ games require 48K. Available on cassette or disk for the TRS-80 Model I/III and Atari 400/800. Available on disk for the Apple II Plus. Available on cassette for the Commodore 64.*

Volume I	*DUNZHIN*	Tape or Disk	$39.95
Volume II	*KAIV*	Tape or Disk	$39.95

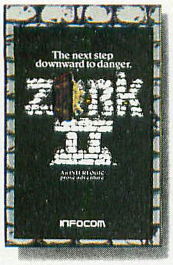
Please add $2.00 for first class postage
$4.00 for overseas order.

ScreenPlay™ P.O. BOX 3558 CHAPEL HILL, NC 27514

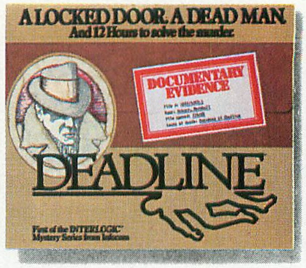
TO ORDER, CALL: 1-800-334-5470, or see your dealer.

Apple, Atari, TRS-80 and Commodore 64 are trademarks of Apple Computer, Inc., Warner Communications, Inc., Tandy Corporation, and Commodore, respectively.











WE'RE WRITING

THEM AS FAST AS WE CAN!

At the rate we're going, we'll have these pages filled by 2083. And by 2084, people will be clamoring for the next Infocom creation.

We hate to disappoint our public. So we keep you waiting. Because while the software factories are cranking out arcade game after arcade game, pulpy adventure after trite fantasy, we're writing and rewriting, honing and perfecting. Before a single person enters one of Infocom's worlds, it must be crafted into a living, riveting, definitive experience.

Judging from the public's reaction, it's worth the wait. For instance, *Creative Computing* welcomed DEADLINE™ as "thoroughly engrossing and realistic," while a *Softalk* readers' poll recently voted ZORK™ I and ZORK II the most popular adventures of 1981.

And now, for the moment, your wait is over. ZORK III, your final step in the underground trilogy, and STARCROSS,™ an exploration of a new dimension in science fiction, are ready for you.

Look at them up there, the little worlds of Infocom. As our universe expands, companions will come to help fill that vast expanse of white space. Till then, they'll continue to stand alone as the best of all possible worlds.

INFOCOM™

55 Wheeler Street, Cambridge, MA 02138

Infocom's worlds are available for Apple,® Atari,® IBM, TRS-80,® Commodore, NEC, Osborne, CP/M,® and DEC.™

GAME MASTER'S APPRENTICE *continued from page 40*

Now write a program to roll and display the seven characteristics for a Runequest character, as shown above. Follow this outline of REM statements.

```
100 REM ** RUNEQUEST CHARACTER
300 REM ** ROLL & DISPLAY 7 CHARACTERISTICS
500 REM ** TELL HOW TO DO AGAIN
900 REM ** SUBROUTINE TO ROLL 3D6
```

IMPORTANT! In block 500, the computer prints "TO DO AGAIN, PRESS SPACE BAR" then waits until someone presses the space bar. When someone presses the space bar, the computer starts at the top and rolls another character.

SCRABBLE SCORES

For all you word game fans, here is our program to compute simple scrabble scores.

In *SCRABBLE*, each letter has a letter score (LS), as follows:

A = 1	G = 2	M = 3	S = 1	Y = 4
B = 3	H = 4	N = 1	T = 1	Z = 10
C = 3	I = 1	O = 1	U = 1	
D = 2	J = 8	P = 3	V = 4	
E = 1	K = 5	Q = 10	W = 4	
F = 4	L = 1	R = 1	X = 8	

We will put these 26 letter scores into an array of subscripted variables, as follows:

LS(1) = Letter Score for A = 1
LS(2) = Letter Score for B = 3
LS(3) = Letter Score for C = 3
LS(4) = Letter Score for D = 2
LS(5) = Letter Score for E = 1, and so on, down to:
LS(26) = Letter Score for Z = 10

Here is the first part of the program.

```
100 REM ** WORD SCORES
110 DIM LS(26), WORD$(50), L$(1)

200 REM ** CLEAR SCREEN
210 PRINT CHR$(125);

300 REM ** READ LETTER SCORES INTO
     ARRAY LS
310 FOR K=1 TO 26
320 READ LS: LS(K) = LS
330 NEXT K
340 DATA 1, 3, 3, 2, 1, 4
350 DATA 2, 4, 1, 8, 5, 1
360 DATA 3, 1, 1, 3, 10, 1
370 DATA 1, 1, 1, 4, 4, 8
380 DATA 4, 10
```

Next we will ask for a word, find out how long it is, and initialize the word score to zero.

```
400 REM ** ASK FOR A WORD
410 PRINT: PRINT "YOUR WORD";
420 INPUT WORD$

500 REM ** WL IS LENGTH OF WORD
510 WL = LEN(WORD$)

600 REM ** START WORD SCORE AT ZERO
610 WS = 0
```

The word score is the sum of the letter scores in a word. If a word contains stuff other than letters, we want to ignore it and use *only* letters. Here is the part of the program that computes the word score. Lines 730 and 740 tell the computer to ignore characters that aren't letters.

```
700 REM ** COMPUTE WORD SCORE
710 FOR L=1 TO WL
720 L$ = WORD$(L,L)
730 IF ASC(L$) <65 THEN 770
740 IF ASC(L$) >90 THEN 770
750 K = ASC(L$) - 64
760 WS = WS + LS(K)
770 NEXT L
```

D_2 R_1 A_1 G_2 O_1 N_1

W_4 I_1 Z_{10} R_1 D_2 H_4 B_3 B_3 I_1 T_1

Lines 720 through 760 are done for L = 1, L = 2, L = 3, and so on up to L = WL. Remember, WL is the length of the word.

Lines 720, 730, and 740 pick out the L character of the word and check to see if it is a letter. If not, lines 750 and 760 are skipped.

If the character is a letter, its ASCII code will be a number from 65 (for A) to 90 (for Z). Thus, in line 750, K will have a value from 1 (for A) to 26 (for Z).

In line 760, the value of K is used to add the appropriate letter score from the array LS to the old word score to obtain the new word score.

All that's left to do is print the word score and tell the computer to report back for more work.

```
800 REM ** PRINT THE WORD SCORE
810 PRINT "THE SCRABBLE SCORE IS "; WS

900 REM ** GO FOR ANOTHER WORD
910 GOTO 410
```

continued on page 46

GAME MASTER'S APPRENTICE *continued from page 44*

Suppose, instead of the letter scores used in Scrabble, you want a different set of letter scores. Easy — just put the letter scores you want in the DATA statements in lines 340 through 380.

A variation. Assign letter scores as follows.

A = 2	G = 17	M = 41	S = 67	Y = 97
B = 3	H = 19	N = 43	T = 71	Z = 101
C = 5	I = 23	O = 47	U = 73	
D = 7	J = 29	P = 53	V = 79	
E = 11	K = 31	Q = 59	W = 83	
F = 13	L = 37	R = 61	X = 89	

Do you recognize the numbers? They are the first 26 prime numbers. Now, modify the program so the word (WS) is the *product* of the letter scores. For example,

Word Score for CAB $= 5 \times 2 \times 3 = 30$
Word Score for DOG $= 7X47X17 = 5563$

A number greater than 1 is either a prime number or a composite number. A composite number can always be written as a product of prime numbers. for example,

$60 = 2 \times 2 \times 3 \times 5$
$175 = 5 \times 5 \times 7$

The first ten composite numbers are 4, 6, 8, 9, 10, 12, 14, 15, 16, and 18. For these, or any larger composite number, can you find a dictionary word (not an abbreviation) whose word score is equal to the composite number? Here are some examples.

NUMBER	WORD	WORD SCORE
6	ab	$2 \times 3 = 6$
12	baa	$3 \times 2 \times 2 = 12$
14	ad	$2 \times 7 = 14$

Carry on! Remember, no abbreviations. Can you find a word for every composite number up to 100? How close can you get to 1000? To 10,000? To 100,000? To 1,000,000?

MUSIC FROM WORDS

Make music from words or from any string of letters. We challenge you to write a program to:

(1) Assign 26 pitch numbers to P(1), P(2), P(3), through P(26). Each pitch number must be a whole number from 0 to 255.

(2) Ask for a word or phrase. When someone enters a word, phrase, or any string, put it in WORD$.

(3) For each letter of WORD$, play the pitch that corresponds to the letter. For A, play P(1); for B, play P(2); for C, play P(3); and so on — for Z, play P(26).

(4) Ignore spaces. In fact, ignore everything except letters.

(5) After playing a tone for each letter, go back and ask for another word or phrase. Or, play the same stuff again and again until people yell, "Turn that BLEEP thing off!"

Is your name musical? Is MATHEMATICS melodious? Can you contrive some tuneful talk?

What would you like to see in DragonSmoke? Send requests to George and Bob, P.O. Box 310, Menlo Park, CA 94025. If you want a reply, enclose a self-addressed, stamped envelope.

The Official

ZAXXON™

by SEGA®



The game that puts space games in perspective. Zaxxon™, one of the most popular arcade games of 1982, is now available for use with your home computer system.

Zaxxon™ technology and creativity present a 3-dimensional-like playfield which sets Zaxxon™ apart from other computer games.

Zaxxon™ looks and sounds like aircraft flight, and players can soar to new levels of home computer entertainment. From the daring attack on the enemy's floating fortress and the blazing battle against the enemy's fighter fleet to the final showdown with the deadly armored robot, Zaxxon™ challenges the skill and imagination of every player at every level of skill.

Imagine yourself the pilot, attacking the enemy fortress—climbing, diving, strafing to score points and extra fuel. The enemy fights back with a barrage of missiles and gunfire. Then you face a fleet of enemy fighters in a gripping dogfight of altitude strategy and flying skill. Survive this battle and the enemy's fortress, defended with laser barriers, then you've earned the ultimate challenge; a blazing confrontation with the powerful robot, armed with a lethal homing missile.

Zaxxon™ is the one game that you must see to believe. You have to play it to feel its impact. If you're ready to face the challenge, check with your local software dealer or send check or money order with $2.00 postage/handling. California residents add 6½% sales tax. Available on cassette or diskette. Suggested retail price $39.95.

Available in January on Atari®, February on Apple® and Radio Shack® Color, and April on TI 99/4A™ and NEC 6000™.

Datasoft Inc.®
COMPUTER SOFTWARE

9421 Winnetka Avenue
Chatsworth, CA 91311
(213) 701-5161
©1982 Datasoft® Inc.

Window on GTIA

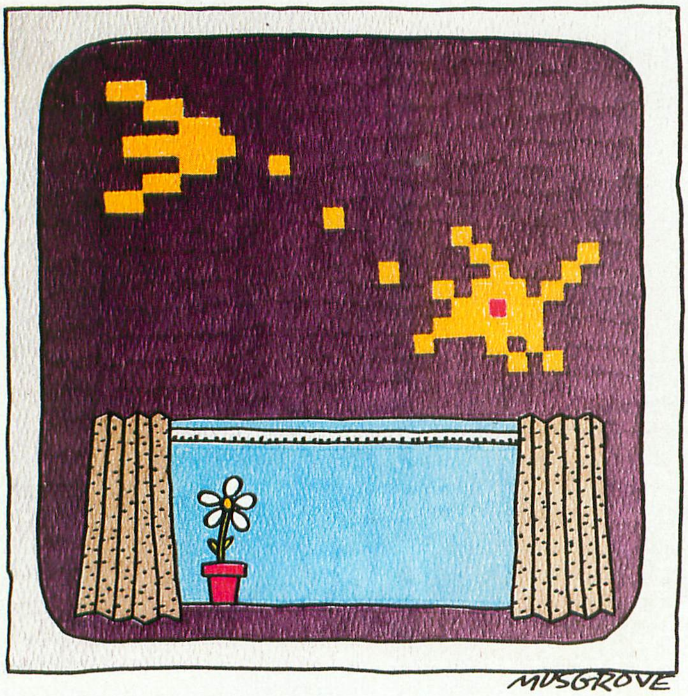
by DAVID SANDERS

Lots of excitement has been generated by the new GTIA chip now being installed in ATARI computers. The older CTIA chip could support only a maximum of five playfield colors at one time, and only in a few modes. The GTIA chip offers three modes which allow up to nine arbitrary colors, 16 shades of one hue, or 15 hues of one luminance plus black.

The real power of the GTIA, however, is that each and every point in the GTIA modes can be set to any of the available colors. They could also be set independently of all other points on the screen.

While it is possible to extend the number of colors on the screen at one time with the CTIA by using Player/Missile graphics, display-list interrupts, or page flipping, all such techniques suffered from serious limitations. Either you could not place colors wherever you wanted, or you experienced unpleasant side-effects such as flicker or wash-out.

It also turned out that ATARI BASIC and the OS have been designed so that they could eventually support these three modes. These modes are set up as Graphics Modes 9, 10, and 11. Each mode uses the same amount of memory as Graphics Mode 8. There is one difference in the support of these modes, though, as compared to Modes 1 through 8. Modes 1 through 8 can be specified either as full-screen modes, by adding 16 to the mode number or as split screen modes with four lines of text at the bottom. Normally, you may use the three GTIA modes only as full-screen modes.



So, why aren't the GTIA modes supported with text windows? If you examine the hardware setup you will discover that all of Graphics Modes 0 through 8, with or without text windows, are supported by the display list which is processed by the ANTIC chip. ANTIC gets display data from memory, interprets it, and sends out simple point-by-point codes to CTIA/GTIA. The new GTIA modes are handled by the GTIA chip itself. There is no provision to manipulate GTIA modes from ANTIC's display list.

Even with these features it would still be nice to have a text window available just below the GTIA graphics for use by BASIC programs. Here I have described exactly how to do that.

Program Listing 1 is a BASIC demonstration that shows GTIA modes combined with a text window. While the demo is rather attractive by itself, its real purpose is to show how to set up a GTIA mode combined with a four-line text window. It also fools BASIC into thinking this is a "normal" configuration.

First, line 10 POKEs 64 into 54286, which is the location of the "interrupt enable" for both vertical blanking and display lists. This ensures that the display list interrupts are turned off while the setup is being created. Then, Graphics Mode 8 is opened with a four-line text window below it. Note that the display list is the same for all three GTIA modes and for Mode 8, except for the fact that the GTIA modes do not normally support the text window.

Line 20 modifies the display list so that a display-list interrupt is generated at the end of the graphics portion of the display. The display-list byte to be modified is at a fixed point from the start of the display list. Locations 560 and 561 point to the start of the display list.

Lines 30–50 set up a short machine language routine at the top of Page Six, then POKE its location into locations 512–513, which is the point for the display-list interrupt. The actual data for the routine is from lines 220–240.

Program Listing 2 shows the Assembly Language code for the machine language routine. This routine does two things when it is executed. It copies the color from the color shadow register for Player/Missile 0 into the background color register (making changes as necessary for attract-mode operation). This is done because of the fact that the GTIA modes assign color-register usage in a completely different manner than normal CTIA usage.

For example, the background color for Mode 10 comes

continued on page 51



A MICROCOMPUTER EXPERIENCE FOR TODAY

Arcaders who've seen and played the ATARI and TRS-80 versions of STRATOS came to the same conclusions — these state-of-the-art games were ahead of their time. After all, any program that boasts crisp graphics, punchy sounds, joystick compatability and a full complement of extras, like high score saving and multi-player option has a definite touch of tomorrow.

THE GAME'S SCENARIO IS A REAL KNOCKOUT

The object is to successfully defend a futuristic city from waves of attacking alien ships.



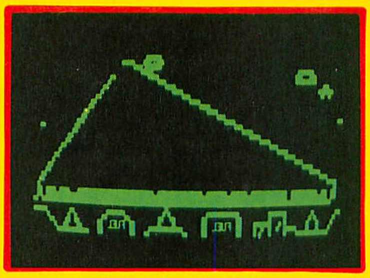
ATARI SCREEN SHOT
The battle begins! Atari version features colors and sounds that YOU can change!

And these crafty alien critters are just part of a rapid-fire graphics bonanza that includes meteor swarms, multiple attack waves, and even a free-moving saucer that will repair your city's damaged force field on the ATARI version.

GOOD NEWS

You don't have to wait years for the spectacular — STRATOS is available now for the ATARI and TRS-80 systems.

STRATOS. Entertainment of the future — today.



TRS-80 SCREEN SHOT
The TRS-80 version blows you away with its Arcade Action Graphics(tm)!

© COPYRIGHT 1982

Adventure INTERNATIONAL

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

ARCADE GRAPHICS ACTION TM

AVAILABLE NOW!

ATARI 400/800 16K TAPE . . .	050-0161	$34.95
ATARI 400/800 32K DISK . . .	052-0161	$34.95
TRS-80 16K TAPE	010-0161	$24.95
TRS-80 32K DISK	012-0161	$24.95

PRICES SUBJECT TO CHANGE

the game control you've been waiting for

TRACK BALL



TG Products, the oldest and largest manufacturer of accessories for personal computers, brings you fantastic control and versatility with the new TRACK BALL control. You will be amazed at how accurately, quickly and easily you can position screen objects in advanced arcade-level games.

$64.95

TRACK BALL is designed for years of reliable, active play and is produced of the highest quality components. Models are available now for your Atari*, Apple II*, and IBM* personal computers. Ask for them at your dealer or order direct from TG Products, 1104 Summit Ave., Suite 110, Plano, Texas 75074. Telephone (214) 424-8568.

TG PRODUCTS

Allow two weeks for shipment.
All mail orders add $2.00 for postage and insurance.
Texas residents add 5% sales tax.

*Atari, Apple and IBM are registered trademarks of Atari Inc., Apple Computers, Inc. and International Business Machines Corporation, respectively.

WINDOW ON GTIA *continued from page 48*

from Player/Missile 0's color, rather than the normal background color. And, more importantly, the priority register is set to zero, which causes any further display to be shown in normal CTIA mode. Since the OS will set the priority register to the value contained in the shadow location at the top of the display, the result is that the display will be segmented into GTIA and non-GTIA portions.

Use of the display-list interrupt permits the mid-display changes to be synchronized to a fixed part of the display to ensure that there is no annoying jumpiness to the point of change.

Computer buffs who want to try playing around with this routine should remember that codes corresponding to lines 0180–0200 and 0270–0280 in the Assembly Language listing are essential. Novice machine language programmers should probably not bother with this for now.

Line 50 also POKEs 192 into location 54286, enabling the display-list interrupt, then POKEs 9 into location 87 to fool BASIC into believing that Mode 9 had originally been set up. BASIC believes that our text window is still present. This is exactly what we wanted!

Remember that Modes 9, 10 and 11 all look alike to BASIC: 80 pixels (dots) across, 192 down, with 16 color codes to choose from for each pixel. Mode 10 has only 9 colors actually available. Codes 9–15 are duplicates of other colors. The POKE to 87 is necessary, otherwise BASIC will believe that it is still in Mode 8 (which is what we started with) and will not plot points as expected for a GTIA mode. Also, because of the text window, there are actually only 160 pixels in the vertical direction.

Lines 60–80 set up the color by POKEing into the nine shadow registers for the colors. Locations 704–707 are used to shadow the Player/Missile colors which are available in Mode 10, and locations 708–712 shadow the usual five playfield color registers.

Line 80 also POKEs location 623 which is essential to enable the GTIA display. If the mode is expressed as a value 9–11, then the value POKEd should equal 64*(Mode 8). The program in Listing 1 expresses the mode as a value 1–3 internally, and converts it for printout by adding 8.

Line 90–120 are the actual demo program. The program draws random rectangles in one of the GTIA modes, then prints out the current mode and a count of rectangles in the text window. The [OPTION] button advances the GTIA mode, [SELECT] clears the screen without changing the mode, and [START] freezes or restarts the rectangle-drawing process.

As you begin to use this program, be aware that some of the following will happen. Whenever you access the disk, the printer or the cassette, display-list interrupts are disabled. This will cause garbage to appear where the text window is normally shown. Don't panic — the text window is okay. All that's happening is that it's now also being shown using a GTIA mode. You must re-enable the interrupt yourself. POKE 192 into location 54286 to do this. Alternately, set up a normal graphics mode before doing your input/output, then execute the following to restore your special GTIA mode.

```
GR.8:POKE PEEK(560)+265*PEEK(561)+166,143
POKE 54286,192:POKE 623,64*(mode–8)
```

Note: mode = 9–11.
Also, re-POKE your color register values.

PRINT#6;CHR$(125) will clear your GTIA display window, as you would expect. It will also blank out your text window. The position of the text window cursor will be left unchanged by this operation.

This program requires a bit of work but I think that you will find the window to be worth the extra trouble.

```
1 REM DEMO PROGRAM TO SHOW
  GTIA MODES WITH TEXT WINDOWS
2 REM THE PROGRAM DRAWS RECTANGLES
  IN THE 3 GTIA MODES
3 REM AND PRINTS MODE/COUNT IN THE
  TEXT WINDOW
4 REM OPTION = ADVANCE TO
  NEXT GTIA MODE
5 REM SELECT = CLEAR SCREEN
6 REM START = FREEZE OR RESTART
10 POKE 54286,64:GRAPHICS 8
20 POKE PEEK(560)+256*PEEK(561)+166,143
30 FOR I=1768 TO 1791:READ A:
   POKE I,A:NEXT I
40 POKE 512,232:POKE 513,6
50 POKE 54286,192:POKE 87,9:M=1
60 POKE 704,0:POKE 705,26:
   POKE 706,54:POKE 707,84
70 POKE 708,104:POKE 709,130:POKE 710,184:
   POKE 711,218
80 POKE 712,6+122*(M=1)+6*(M=2):POKE
   623,64*M:C=0
90 COLOR (8+6*(M<>2))*RND(0)+1
100 I=INT(72*RND(0))+4:J=INT(72*RND(0))+4
110 A=INT(144*RND(0))+8:B=INT(144*RND
    (0))+8
120 PLOT I,A+1:DRAWTO
    J,A+1:
    DRAWTO J,B+1:DRAWTO I,B+1
130 PLOT J,B:DRAWTO I,B:
    DRAWTO I,A:DRAWTO J,A
140 C=C+1:POKE 752,1:PRINT "    MODE=";
    M+8;"  #";C
150 A=PEEK(53279):IF A=7 THEN 90
160 POKE 77,0:IF A<4 THEN GOSUB 210:M=
    M+1-3*(M=3):GOTO 80
170 IF A<6 THEN GOSUB 210:C=0:GOTO 90
180 PRINT " **** FREEZE ****":
    FOR I=1 TO 200:NEXT I
190 IF PEEK(53279)<>6 THEN 190
200 POKE 77,0:FOR I=1 TO 50:
    NEXT I:GOTO 90
210 PRINT #6;CHR$(125):FOR I=1 TO 200:
    NEXT I:RETURN
220 DATA 72,141,15,212,141,10,212
230 DATA 173,192,2,69,79,37,78,141,26,208
240 DATA 169,0,141,27,208,104,64
```

ATARI PR

The ability to redefine ATARI's character set provides many exciting possibilities. Redefined characters can be used to create special symbols such as those used in mathematical calculations or chemical formulas. This same principle can be applied to create anything from a map to a monster. For example, character graphics are used to create the monsters in ATARI's Space Invaders, to create the terrain in APX's Eastern Front, and to create the puzzle parts in ARTWORX's Nominoes Jigsaw.

In standard printing practices, character sets are available on a *font*, which contains a complete assortment of any one size and style of type. For microcomputers there are various utility software products available that make character creation relatively easy. What is not so easy is to remember how each character has been redefined. ATARI Printfont can help you find these different characters in your font files.

Let's assume you've just created a font file where various characters will be combined to create four different space vehicles. You have redefined many of the lowercase letters and standard graphics characters. Now you want to define strings of the characters that form each ship. The problem is that you don't remember which characters create which ship.

The following program can provide a printed listing for quick and easy reference. The font file reads from Disk Drive One to list all 128 characters. You must have 24K RAM, a disk drive and an 80-column printer.

The program listing is well-documented with REM statements. It is written in ATARI BASIC with one assembler subroutine. Stored in the string FL$, the assembler routine is used to transfer the disk font file into RAM. This could have been done with a FOR/NEXT loop and the GET command, but it would take at least ten seconds. The assembler routine works in less than two seconds.

Since this program listing will appear in a magazine, a routine was added to read the DATA from lines 500 and 510 to create the FL$ string. Once this has been done, you can eliminate this routine and permanently store the routine as a string in the program. To do this, add a STOP com-

```
10 GOSUB 390:REM PRINTFNT
   102082 (c) 1982 by Jerry White
20 REM READ MACHINE LANGUAGE
   FONT LOADER INTO FL$
30 DIM FL$(32):FOR ME=1
   TO 32:READ IT:FL$(ME,ME)=CHR$
   (IT):NEXT ME:? :? " READING ";FONT$
40 ME=USR(ADR(FL$)):CLOSE #3:POKE 710,0:POKE 756,48
50 REM DISPLAY FONT
   NAME & LOCATE
   SCREEN MEMORY
60 ? CHR$(125):POSITION 19-LEN
   (FONT$)/2,2:? FONT$:SM=PEEK
   (88)+256*PEEK
   (89):SCREEN=SM+160
70 REM POKE CHARACTER
   SET ONTO THE SCREEN
80 FOR ME=0 TO 255:POKE SCREEN+ME*2,ME:NEXT ME
90 POSITION 8,19:?
   "PRINTING CHARACTER
   SET":FONT=12288:CNUM=0:OFFSET=FONT+512:GOSUB 160
100 REM FONT BEGINS ON PAGE 48
    (48*256=12288)
110 REM PRINT ON FOUR PAGES
    WITH 32 CHARACTERS ON EACH
120 OFFSET=FONT:GOSUB 160:OFFSET=FONT+256:
    GOSUB 160:OFFSET=FONT+768:GOSUB 160
130 REM ALL DONE SO TELL
    HUMAN WHO HAS CONTROL
140 POKE 82,2:CLOSE #2:GRAPHICS 0:? :? "BASIC":
    ? "IS";:POKE 752,0:END
150 REM PRINT HEADING
    & ONE 8 BY 4 PAGE OF
    THE CHARACTER SET
160 ? #2;DISK$:? #2
170 REM PRINT ASCII
    CHARACTER NUMBERS
180 FOR ME=1 TO 4:? #2:? #2:FOR AC=0 TO 7:? #2;"ASC ";
    CNUM+AC,:NEXT AC:CNUM=CNUM+8:? #2:? #2
```

INTFONT

by JERRY WHITE

mand as line 35. When you RUN the program and it stops at line 35, type PRINT FL$ [RETURN]. Move the cursor over the first character of the string which should be a small letter "h". While pressing [CTRL], press [INSERT] eight times. In the space we just created in front of the string, type "35 FL$ =" then press [RETURN].

Don't worry about the end quotes for the string because BASIC will do that for you. Now delete the FOR/NEXT loop from line 30, leaving only the DIM and PRINT statements. You may also delete lines 500 and 510 since you won't be needing the DATA anymore, and don't forget to resave the program.

This assembler routine is set up to put the character set on Page 48 in memory, or beginning at RAM location 12288. If you'd like to use this routine to store a character set someplace else in another program, just change the fifteenth byte in the string as needed. You may find it worthwhile to keep the DATA statements, and change the last number in line 500 (48), to the desired page number in memory.

The rest of the program and its operation are relatively straightforward. Just remember that when you enter your font filename, you will be using Disk Drive One.

TYPO TABLE

Variable checksum = 340867

Line num range		Code	Length
10	— 90	CZ	567
100	— 180	VN	538
190	— 290	XW	521
300	— 410	ON	569
420	— 500	HO	501
510	— 510	OF	57

```
190 REM PUT 80 BLANKS IN CAR$
200 FOR J1=1 TO 8:CAR$=" ":
    CAR$(80)=" ":
    CAR$(2)=CAR$
210 REM PEEK AT CHARACTER SET
220 FOR J2=1 TO 80 STEP 10:IT=PEEK(OFFSET)
230 REM IF BIT THEN
    REPRESENT AS *
240 IF IT>127 THEN CAR$(J2,J2) ="*":IT=IT-128
250 IF IT>63 THEN CAR$(J2+1,J2+1) ="*":IT=IT-64
260 IF IT>31 THEN CAR$(J2+2,J2+2)= "*":IT=IT-32
270 IF IT>15 THEN CAR$(J2+3,J2+3)= "*":IT=IT-16
280 IF IT>7 THEN CAR$(J2+4, J2+4)="*":IT=IT-8
290 IF IT>3 THEN CAR$(J2+5,J2+5) ="*":IT=IT-4
300 IF IT>1 THEN CAR$(J2+6,J2+6)= "*":IT=IT-2
310 IF IT=1 THEN CAR$(J2+7,J2+7)="*"
320 OFFSET=OFFSET+8:NEXT J2
330 REM ONE LINE OF
    PRINT NOW READY
340 OFFSET=OFFSET-63:? #2;CAR$:NEXT J1
350 OFFSET=OFFSET+56:? #2:NEXT ME
360 REM SPACE TO NEXT PAGE
370 FOR ME=1 TO 12:? #2:NEXT ME:RETURN
380 REM SETUP STRINGS AND SCREEN
390 DIM FONT$(12),DISK$(14),CAR$(80):GRAPHICS
    0:POKE 710,162:POKE 82,5:POKE 83,38
400 REM PROGRAM ASSUMES ITS DISK
    INPUT WILL BE ON DRIVE 1
410 ? :? :? "DISK FONT TO PRINTER UTILITY":
    ? :? "ENTER FONT NAME";:INPUT FONT$:
    DISK$="D:":DISK$(3)=FONT$
420 REM OPEN DEVICE
    2 AS THE PRINTER AND SET A
    TRAP FOR NOT READY
430 POKE 201,10:TRAP 460:CLOSE #2:OPEN #2,8,0,"P:"
440 REM OPEN DEVICE 3
    AS DISK INPUT AND SET A TRAP
    FOR FILE NOT FOUND
450 TRAP 410:CLOSE #3:OPEN #3,4,0,DISK$:POKE 752,
    1:? :? "SETTING UP FONTLOADER IN FL$":RETURN
460 ? :? "MAKE PRINTER READY":?
    "THEN PRESS START"
470 IF PEEK(53279)<>6 THEN 470
480 GOTO 430
490 REM DATA MACHINE
    LANGUAGE ROUTINE FL$
500 DATA 104,162,48,169,7,157,66,3,169,0,157,68,3,169,48
510 DATA 157,69,3,169,0,157,72,3,169,4,157,73,3,32,86,
    228,96
```



DISKEY

by Sparky Starks

Potential into practical reality. This is the core of DISKEY — a remarkable utility program that gives ATARI disk drive owners the flexibility to accomplish tasks that other utilities either ignored or only hinted at. With DISKEY, the user will be able to actually examine a disk and its directory, and repair some files that might otherwise have been lost. DISKEY also performs a multitude of other practical functions, including the following:

★ Automatically lists any unreadable or destroyed sectors
★ Sends contents of disk to printer selectively
★ Up to four separate drives may be addressed
★ Can be used to backup some of those "unbackupable" disks
★ Allows direct examination of any file
★ Over 50 separate key functions available

As an ATARI 400 or 800 owner, you have extraordinary power and versatility at your disposal. Tap into those resources effectively with DISKEY — new from Adventure International.

ATARI 400/800 32K DISK
052-0158 $49.95
(Note: Some features will require 40K)

SOME OF DISKEY KEY FUNCTIONS

A	Clear screen and filename
B	Byte compare, D1 to D2, OS to DS
C	Copy sectors, OD to DD, OS to DS
D	Toggle destination drive
E	Erase disk (format)
F	Select file sub-menu
L	Set automatic function lower limit (OS)
M	Modify Sector Map
N	New destination sector
O	Toggle originate drive
P	Print screen to printer
Q	Query (search for hex key, drive OD, sector OS to DS)
R	Read new OS, set DS to match
S	Search for ASCII key, drive OD, sector OS to DS
T	Tape to disk
U	Upper case conversion of printer lower case
V	Toggle write verify
W	Write memory buffer to sector DS, drive DD
X	Select EOR Sector Map screen print mask
Z	Zero memory buffer
+	Read upward, next sector on disk
−	Read downward
?	Directory information
!	Select directory sub-menu
cB	Byte compare, D1 to D2, whole disk
cC	Copy D1 to D2, whole disk
cD	Decimal to hex, ASCII conversion
cE	Erase disk (without new format)
cF	Modify sector forward sector chain reference
cH	Hex to decimal, ASCII conversion
cL	Locate bad sector on drive OD
cN	Modify sector file number reference
cO	Select one-drive functions sub-program
cP	Print current Disk Map
cR	RPM test drive OD
cS	Special file copy, no directory reference from source
cV	VTOC update and repair, drive OD
cY	Toggle Sure Response prompt enable
FA	File binary load address headers to printer
FD	Delete file
FF	Select filename for all file functions
FL	Lock file
FM	Show memory address load position in file
FQ	Relative Query
FR	Rename file
FS	Relative Search

BASIC ROUTINES FOR THE ATARI

by Jerry White

Finally, a self-help system that cuts through the stuffy technical jargon and allows the user to learn effective programming techniques fast! BASIC ROUTINES FOR THE ATARI has been written especially for ATARI 400 or 800 users who wish to write programs in BASIC. This package comes complete with an extensive manual and your choice of a tape or disk which contains all of the routines from the manual — which means you'll be able to actually see each of them in action on your ATARI. Some of the BASIC routines include joystick, sound, player missile strings and much more — and presented in a way that you'll quickly be able to learn and apply to your own programs.

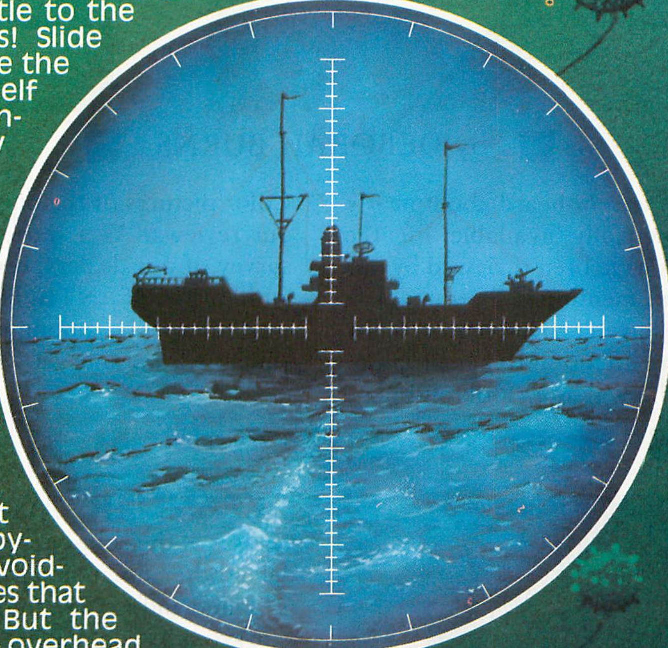
If your programming ability lies somewhere between beginning and advanced, then look no further — BASIC ROUTINES FOR THE ATARI is the system for you.

BASIC ROUTINES book with 16K TAPE
051-0154 $24.95
BASIC ROUTINES book with 24K DISK
052-0154 $24.95

Published by Adventure International
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

To order, see your local dealer. If he does not have the program, then call 1 (800) 327-7172 (orders only please) or write for our free catalog.

ABSOLUTELY RELENTLESS



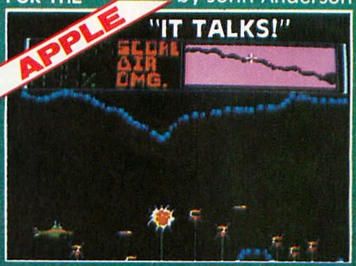
The challenge of inner space — the fury of an enemy that seemingly will not die. This is SEA DRAGON — a battle to the death **under** the high seas! Slide into the Captain's chair, take the controls and prepare yourself for the most incredible non-stop action this side of Davy Jones' locker. SEA DRAGON puts you in control of a nuclear sub that's armed from stem to stern with enough firepower to take on King Neptune himself — and you'll need every missile, every torpedo, and every scrap of skill you can muster to survive.

The object of SEA DRAGON is to successfully navigate your sub through an underwater course past mountains and through labyrinthine passageways while avoiding clusters of explosive mines that rise from the seabottom. But the danger doesn't stop there — overhead, surface destroyers lace the water with depth charges; below, deadly attack bases and arcing lasers cut a killing swath that could reduce your sub to bubbling slag. But even these potentially lethal perils are dwarfed by the awesome menace that awaits you at the course's end.

SEA DRAGON — every possible "extra" is here to ensure your playing pleasure: exciting sounds, high score save, machine language graphics and an eye-popping scrolling seascape that extends the equivalent of over two dozen screens placed end-to-end, providing a diverse and unique challenge that will not diminish after repeated playings.

Nothing you've ever seen on your micro could possibly prepare you for this! You are ready now, ready for the ultimate in undersea action with a pace that is absoutely unyielding. SEA DRAGON — the arcade has finally come home.

FOR THE APPLE by John Anderson



FOR THE ATARI by Russ Wetmore



FOR THE TRS-80 by Wayne Westmoreland & Terry Gilman



ALL VERSIONS ARE JOYSTICK COMPATIBLE!



SEA DRAGON FEATURES

- Fantastic Scrolling Seascape
- Nearly Limitless Game Challenge
- High Score Save (disk version)
- Terrific Sound Effects
- Arcade Action Graphics™
- Apple version "talks" without special hardware!



ORDERING INFORMATION

APPLE 2 or APPLE 2 PLUS 48K Disk (DOS 3.3 required)	042-0146	$34.95
ATARI 32K Disk	052-0146	$34.95
ATARI 16K Tape	051-0146	$34.95
TRS-80 32K Disk	012-0146	$24.95
TRS-80 16K Tape	010-0146	$24.95

Adventure INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC.
PRICES SUBJECT TO CHANGE

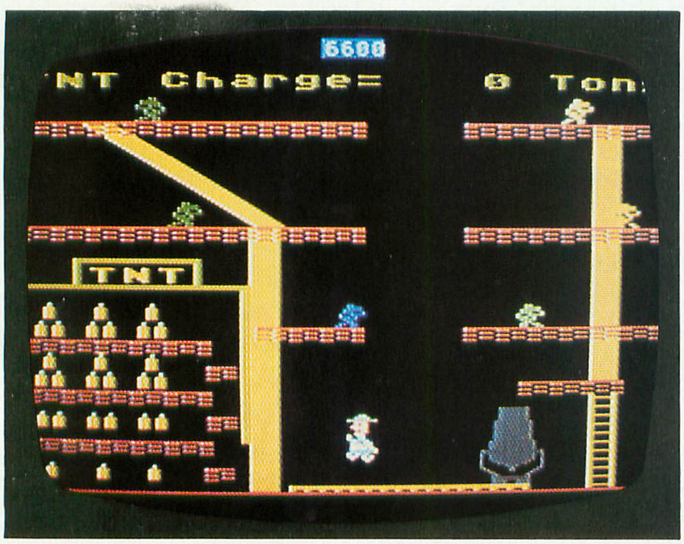
To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

ANTIC PIX TEN

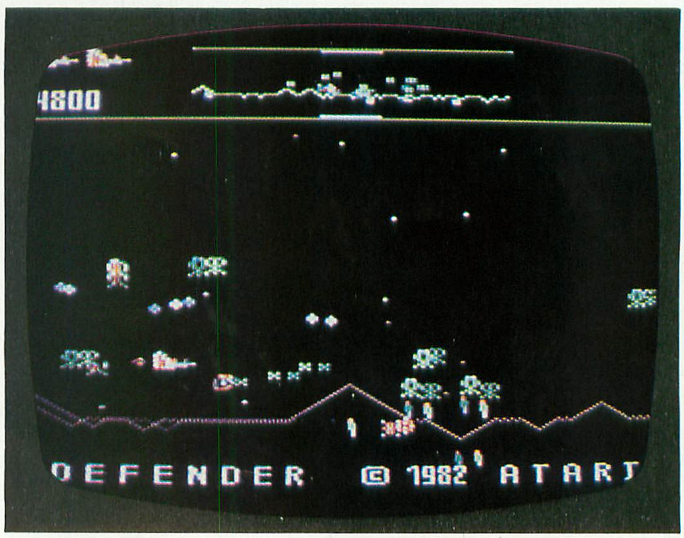
by DEBORAH BURNS

Over the past year, ANTIC has seen or heard about nearly all the game software commercially available for the ATARI computers. Some games have been reviewed by our writers and others have been mentioned in our New Products department — but we haven't covered them all by any means. We aim to give more attention to games in upcoming issues — particularly the way they look and play. Color pictures of the playfields will frequently accompany our reviews. As a start, we have conducted an informal survey of our dealers, distributors and friends to come up with this list of ANTIC PIX. We have chosen ten games that we found to be among the most popular, interesting and valuable programs yet written for your amusement.



MINER 2049er, Big Five Software. "Bounty Bob", a typical gold-rush prospector, climbs the treacherous mine shaft in pursuit of precious treasures, but also finds obstacles from the 21st century. These futuristic difficulties include deadly mutant organisms and radioactive waste. Ten different zones appear in which the challenges of the mine shaft increase. In each zone you must avoid contact with the roaming mutants unless you neutralize them first. As you climb and jump to the next zone, you score points by gathering tools and zapping mutants while dodging laser beams and the pulverizers. This cartridge-based game has several speed levels which require strategy changes as well as quick reflexes.

DEFENDER, Atari, Inc. In this home-computer version of the coin-operated arcade game, the airship must defend the humanoids from dreaded mutants. Your object is to land and retrieve the humanoids and transport them to safe ground. You will be harrassed by the Landers, Baiters, Swarmers, Bombers and the Pods. The Landers kidnap your humanoids and change them into mutants who join the forces against you from all sides. The other enemies lay mines to trap you, surround you and fire at you at every turn. Your players has three lives to save by dropping Smart Bombs and firing laser shots, but it takes a quick wrist to master this game. The game provides a radar map that monitors your position and helps you plan your best strategy.



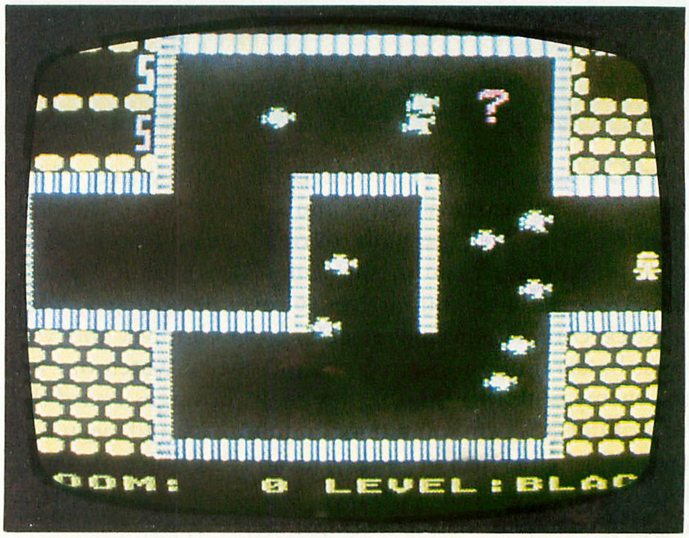


GORF, Rocklan Corporation. The object in this game is to repel the evil Gorfian robot invasion and launch a counterattack. You may use the protective forcefield arc and the quark-laser weapon to aid your defense. In the various scenarios you must avoid fire from two anti-particle laser beams and the kamikaze Gorfian ships that attack you while emerging from a space vortex. If the Gorfian flagship is destroyed, you get a new ship and the game returns to the first scenario, except that it's moving at a faster pace. This is a translation of a popular arcade game, and is similar to Galaxian and Space Invaders.

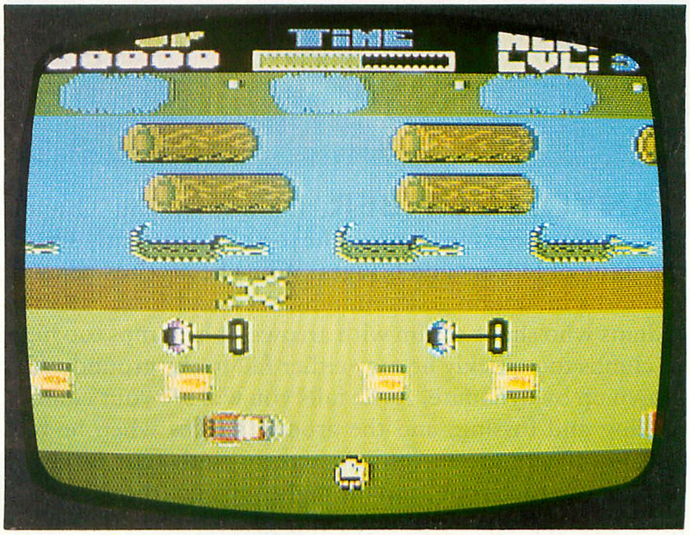


EASTERN FRONT, Atari Program Exchange. This classic war game is played out on a scrolling map of Europe during World War II. As the player, you control the German forces pitted against the Russians. Play is turn-sequenced, meaning you have plenty of time to consider your move, but you'll need it — because the Russians are played by the computer — and in real life the Germans lost. As the game progresses time passes. Rain falls and mires your tanks. Snow falls to freeze your troops. Supplies run low and morale cracks. The realism of this campaign has never been matched (to hear war-gamers tell it) and you will certainly earn your stars if you can win this one.

SHAMUS, Synapse Software. This game is a meld of action and adventure. Shamus, the player-detective, must fight his way through four levels of labyrinth where various baddies block his path. Enroute he gathers the keys to secret rooms and passages on different-colored levels. Things are easy on the first level, where slow-moving drones fire at Shamus, but you dare not dawdle. You must make a map (mentally at least) to quickly find the keyholes for the corresponding keys Shamus collects. If he loses all his lives, he loses his keys and you'll never solve the case. The Shadow, his arch-enemy, passes through walls and will try to stop him at every turn.

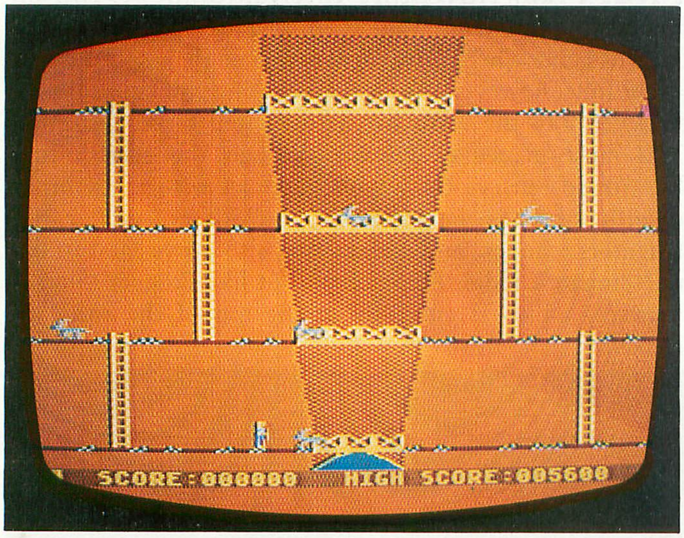


PREPPIE!, Adventure International. A "Day on the Nasty Nine with Wadsworth Overcash" is the setting for this game where Ivy Leaguers pursue their sport. Most of the time, however, the player is chasing golf balls that are knocked into the wilds by the malicious Groundskeeper. You must maneuver Preppie through the ever-shifting hazards to retrieve these balls. Contact with many other objects such as lawnmowers, bulldozers, golf carts, alligators, canoes, and a giant frog also prove fatal to the unfortunate caddie. Preppie! is a lot like Frogger (Sierra-Venture) which is currently at the top of the software charts.



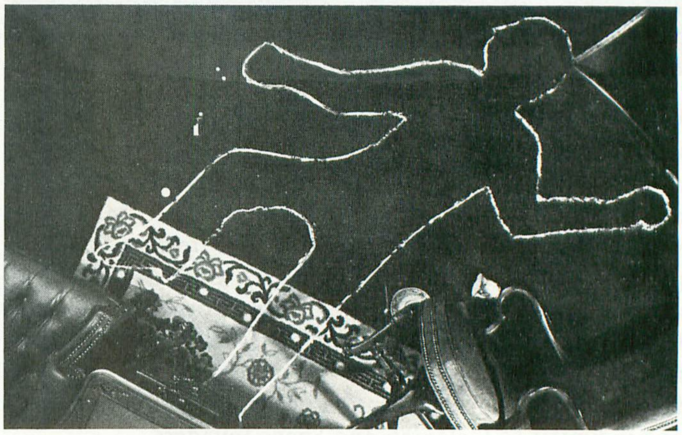


CHOPLIFTER!, Broderbund Software. This fast-action game realistically simulates a night rescue mission by helicopter, perhaps during recent history. The setting is an American prison camp in a Middle Eastern desert where the aircraft arrives to save the hostages. Your joystick controls the movement of the chopper and you must be careful not to crush the prisoners. Watch out for the enemy tank that approaches as the hostages board the "choplifter". When you've finally taken off and begun to feel safe, fighter jets are likely to attack. You may shoot bullets (not missiles) in defense, but score points by succeeding with your rescue attempt.

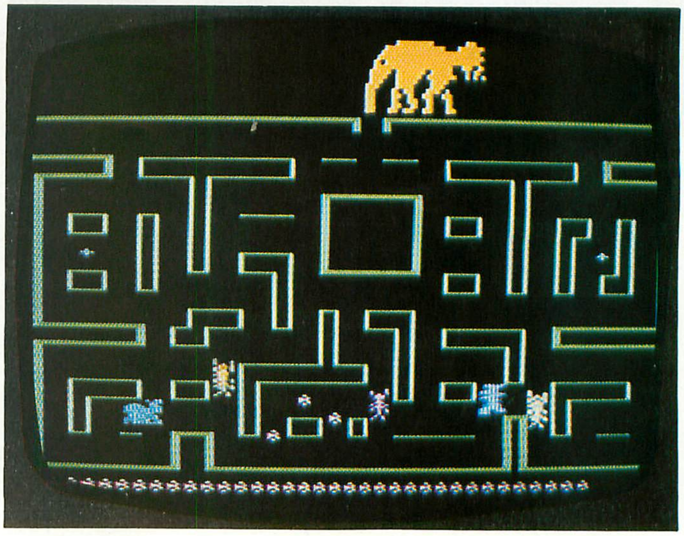


CANYON CLIMBER, DataSoft. The "Canyon Climber" attempts to climb to the top of a constantly scrolling scene of ladders and bridges. While he ascends he must avoid the mountain goats running back and forth, and the Indians who shoot at him with arrows. If he jumps too high or climbs too quickly he may either fall to the ground or be blown up by dynamite. As he falls you will see your climber kicking and fussing, and the ground shakes when he hits bottom. There are three main screens with four levels of difficulty in each zone, and the higher you go, the tougher it gets. Young players will enjoy this game.

DEADLINE, Infocom. As the only text adventure in our group, Deadline represents many computer games, some among the earliest, and some surely among the most popular of all computer games. For example, the Scott Adams series (Adventure International), the ZORK series (Infocom), and Empire of the Overmind (Avalon Hill) deserve mention. Deadline takes this genre further, presenting the player with a murder, and a packet of clues including a photo of the scene of the crime. The challenge is to use the clues to identify the murderer, who is among the cast of characters you may question with the computer. Text games can be real mind benders, and probably presage an era of computer interaction where the user really plays a role.



K-RAZY ANTIKS, CBS Software. How could we not like a game called ANTIKS? In this cartridge-based maze game, your object is to keep the white ants safe from hostile enemy ants and the dreaded Anteater. The enemy ants attempt to invade the Anthill, and when you least expect it the Anteater pokes his muzzle into your abode and sucks you up. The best way to ensure your survival is to deposit white eggs within the maze's passages and lure enemy Ants into the path of the Anteater. You may also save the Anthill by allowing the deadly flood of waters to flush the enemy out. The maze changes size and shape with each succeeding level and the action becomes faster and more complicated.



ATARI® 400 or 800 OWNERS
INTRODUCE YOURSELF TO THOUSANDS OF NEW PROGRAMS
PLUG IN A FLOPPY DISK DRIVE FOR LESS THAN
$450.00

There are thousands of programs available only for computers with floppy disk drives. Micro Mainframe is proud to introduce our floppy disk drive system for the Atari® 400 and 800 computer systems. Our disk system provides the best features at the lowest price available.

STANDARD FEATURES:

- Comes complete and ready to run*
- Double density operation without patches to Atari® DOS
- Single or double density operation software or hardware selectable
- Printer port for standard Centronics parallel printers
- Eliminates the need for the 850 Expansion Interface
- 4K Printer spooler expandable to 54K
- Can be used with all your current Atari® peripherals
- Add additional drives for less than $300.00
- Supports double sided and 8″ floppy disk drives**
- MMF hard disk expansion drives available
- Reads all protected software disks
- Digital Phase Locked Loop Data Separation
- 90 Day factory warranty

With the addition of our expansion box, you can turn our disk drive into a full 64K Z-80® computer using your Atari® as a color terminal allowing you these additional features:

- Run CP/M® software
- Run TRS-80 Model II® software
- Run Oasis® software
- Full 64K Z-80® computing power
- Multiuser operation***

YOU'LL AGREE WITH EVERYBODY ELSE THAT MICRO MAINFRAME IS YOUR BEST BUY IN PERIPHERALS FOR YOUR ATARI® 400 OR 800

Dealer Inquiries are Solicited

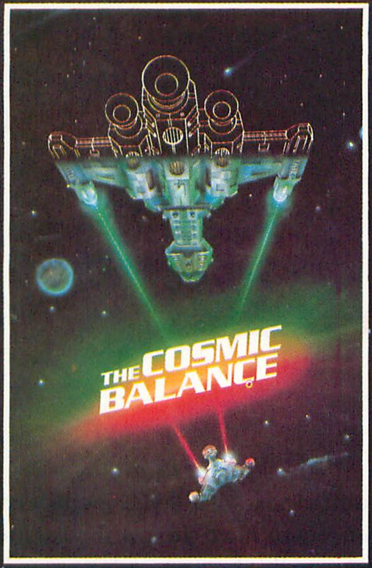
MICRO MAINFRAME

11325 Sunrise Gold Circle, Bld. E
Rancho Cordova, CA 95670
(916) 635-3997

* Atari® DOS required
** Requires Maxi-DOS A® (available mid '83)
*** Requires Oasis® Software

Atari is an Atari trademark
Oasis is a Phase One Systems trademark
CP/M is a Digital Research trademark
TRS-80 is a Tandy trademark
Maxi-DOS A is a Micro Mainframe trademark
Z-80 is a Zilog trademark

THE GALAXY AWAITS YOUR COMMAND.



When SSI introduced THE COSMIC BALANCE™, it was hailed as one of the finest **tactical** space game ever made. It not only gave you starship combat that was fun, fast and furious, it also let you design your ships. You became both starfleet commander and starship architect.

Now we are proud to present its **strategic-level** sequel — THE COSMIC BALANCE II™. It allows all you aspiring Galactic Emperors out there to plot the growth of your space kingdom — from a few, paltry planets to the entire Galaxy! You discover and colonize planets, establish commerce nets, organize production of necessities, and send starships out on missions. There are five scenarios prepared for you, but you are free to create your own.

No matter how you play it, THE COSMIC BALANCE II™ is a game of interstellar conquest. And the only way you're going to enlarge your share of the cosmic pie is to win starship battles against your opponent (which can be a human or the computer).

When actual combat occurs, you can let the computer resolve it instantly. Or you can slug it out in all its blazing glory by using THE COSMIC BALANCE™. The battle outcome can then be incorporated into the strategic game.

Space may be what these games are all about, but there isn't enough of it here to adequately describe them. But why read when the Universe beckons? Plot a course to the nearest computer/game store and get these games today! You have a destiny to fulfill — a destiny that lies out there among the stars.



ON DISC FOR THE APPLE® AND ATARI®.

THE COSMIC BALANCE & THE COSMIC BALANCE II ($39.95 each) are on 48K diskette for the Apple II+ or Apple II with Applesoft ROM Card. Also on 48K disk for the Atari 400/800.

RapidFire
GAMES FROM SSI

Apple is a registered trademark of Apple Computer, Inc.

Atari is a registered trademark of Atari Inc.

If there are no convenient stores near you, VISA and MASTERCARD holders can order direct by calling **800-227-1617, x335 (toll free)**. In California, call 800-772-3545, x335.

To order by mail, send your check to: **Strategic Simulations Inc**, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. California residents, add 6½% sales tax.

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

AUTO PILOT

by KEN HARMS

In our grand tradition, we again present you avid Pilots with something from the wide blue yonder — a previously unreported program to make your flights of fancy easier. Our Auto Pilot is a self-loading menu program that you can put on every Pilot disk. It is so easy to use, even young children can do it — in fact, that's why I designed it and they like the animated face that tells them what to do. Nevertheless, the menu is sophisticated and makes use of previously unpublished aspects of Pilot that allow it to call other programs from itself.

With Auto Pilot on your disk, powering up the ATARI automatically loads a short program which draws a face and animates its mouth to form the words "Please wait half a minute." That program loads another program which displays the menu (the first 20 files on the disk, each with a "program number") and animates the mouth to ask "Please type number for the program you wish to run." When the number, followed by a [RETURN], is entered, the chosen program is automatically loaded and run. When the operator wishes to change programs, [SYSTEM RESET] restarts the menu programs.

The system requires no changes to your existing Pilot programs. If the three files we will create are on the disk, they will run any Pilot programs automatically. After you've built the three files, using this article, a process which should take only an hour or two, you merely copy them using DOS option O to any disks you wish, which takes only a few minutes.

Every Pilot Your Atari tries to present a tutorial in the form of useful programs. This article demonstrates the Pilot variable table and the use of one program to LOAD and RUN another. Tape users could find these concepts useful but won't be able to use the system. (Although it isn't possible to make an efficient tape-based menu system, the *Pilot Primer* presents one which you may try.)

Start with an empty, formatted disk. The first program is PUTTER. Power up under BASIC and enter PUTTER. SAVE the program under the name PUTTER and RUN it to produce an AUTORUN.SYS file on the new disk. If the number check doesn't check, examine your typing and redo. Finally, test the AUTORUN.SYS program by powering off and on. You should hear DOS booting and then see several valid Pilot commands displayed with error messages. That's okay since you have the BASIC cartridge loaded and it won't recognize Pilot commands.

So far, we've typed in a program called PUTTER which runs under BASIC to produce a "binary file" under the name AUTORUN.SYS. A binary file is a string of numbers which the ATARI will read as an Assembly Language program. Since the program is in the name AUTORUN.SYS, it will be read and executed each time the computer is powered up (see DOS manual for more information). Part of this Assembly Language program fools the ATARI into accepting data from the disk as if they came from the keyboard, and attempting to execute them under direction from the cartridge. This program includes five Pilot commands. You saw them when you tested it under BASIC. First, a one is C:omputed into position 580. That tells the ATARI to reboot DOS whenever the RESET button is pushed. Next, the screen colors are changed to turn the borders red and the letters to blue so that the "Ready" prompt won't display while the menu programs are being loaded. Last, two instructions load a program called MENU.SYS and run it.

The AUTORUN.SYS program will load any Pilot program which has been saved in a file called MENU.SYS. You can SAVE your favorite program under that name and it will load and execute whenever the ATARI is booted or RESET is pushed. Be sure to add a GR:QUIT or other GR:aphic call to the front of your program to reset the screen colors.

On to the next task. Pull out the BASIC cartridge and insert PILOT. When you turn power back on you'll get an error 170 since the computer was looking for a file called MENU.SYS and, naturally, didn't find it. Type in the MENU.SYS program. When you get to the *FACE and later modules, you'll see some T:ype lines with graphics characters exactly as they appear in the listing, so that the face will appear on the screen as it will appear when the program runs. Now SAVE the program in a file called MENU.SYS. RUN the program to see if it draws a face and moves the mouth. If everything works right it'll fail with an error 170 since it looks for a file called DIRECT.SYS which

continued on page 65



FOR THE
ATARI®
400/800

by
Robert Jaeger

Only your skill will save you!

You, Pinhead the Clown™, are at the circus performing the ultimate acts of acrobatics. You ride the high wire on your unicycle, catching, popping and kicking balloons.

Keys, umbrellas, more balloons, and other objects will come at you from all directions — any one of them could make you lose your balance and go hurtling to the ground! Pinhead™ will give you hours of enjoyment and excitement!

PINHEAD™ is written in machine language and contains Arcade Quality graphics and music.

PINHEAD™ Atari® 400/800 16K tape or 16K diskette, $29.95.

To order, see your local dealer or send check or money order to:

UTOPIA Software Inc.
58 Millay Road • Morganville, NJ 07751
or call (201) 536-1191.

Atari® is a registered trademark of Atari, Inc.

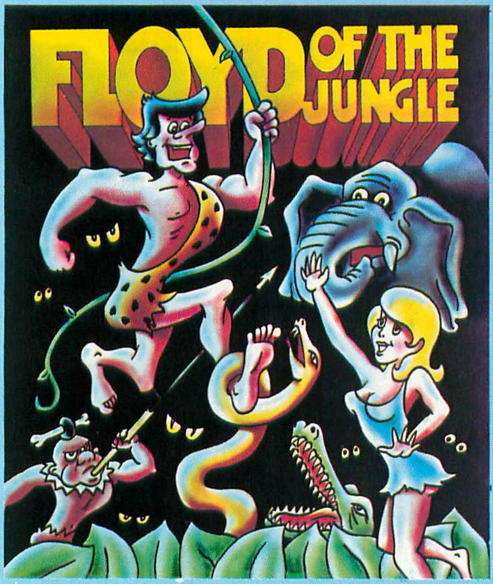
Experience the MicroProse Challenge ! ! !



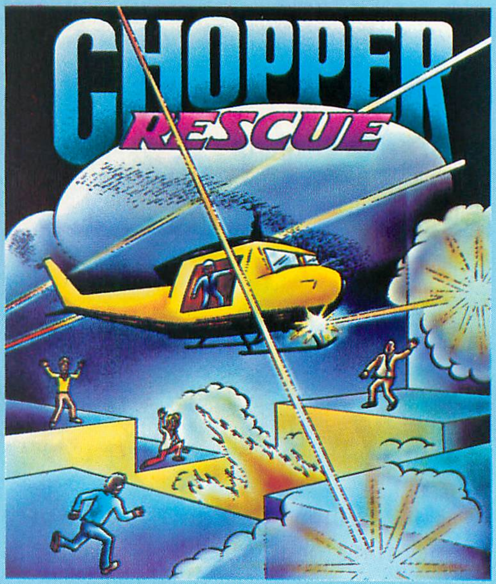
Brief Blue 2, your computer wingman, on his mission and he will follow your instructions and lead into an air to air and air to ground battle against enemy territory . . . But, look out for Red Flight; they defend their territory and attack yours! . . . Scrolling, split screen challenge for 1-4 players . . . ATARI, 32K Disk or Cassette . . . $34.95.



Fly combat in a three-dimensional aerial dogfight over the Pacific during WWII . . . Requires real fighter pilot skills and maneuvers to survive to become an Ace or a W.G.F.P.! . . . Try "SPITFIRE ACE" for aerial combat over Europe . . . 1-4 player combat . . . ATARI, 40K Disk or 32K Cassette . . . $29.95.



Race through the dangerous jungle avoiding the elephants, alligators, pigmies with poison darts, and other jungle perils to be the first to rescue the lovely Janice! . . . A zany footrace for 1-4 simultaneous players . . . ATARI, 32K Disk or Cassette . . . $29.95.



Pilot you nimble assault helicopter through the complex underground labyrinths. Destroy the enemy aircraft and defenses while you fight your way to rescue the captives trapped inside . . . Solo or team excitement for 1-8 players . . . ATARI, 32K Disk or Cassette . . . $29.95.

MicroProse Software is dedicated to bringing you games that challenge you far beyond the first few plays. We promise you hours of excitement and pleasure. Our games are created using "MicroProse", our own proprietary assembly language gaming system, and are available at select computer stores.

If you can not find our games at your computer store, you can order by MasterCard or Visa, money order, COD or check. Add $2.50 for postage and handling. MD residents add 5% sales tax. Call or write:

MicroProse Software 1 Caribou Court, Parkton, MD 21120, (301) 357-4739

DEALER INQUIRIES WELCOME!

ATARI is the registered trademark of ATARI, Inc.

AUTO PILOT *continued from page 62*

you haven't typed yet.

MENU.SYS includes some interesting commands. Lines 60 and 70 are "C:ompute at byte" instructions. The number following the "B" is an "address" of a character (or "byte") of memory. The ATARI uses values in certain addresses to control features of the system. The address 752 turns the cursor off (1) or on (0). Location 709 controls the color of text characters. These commands are used later (see lines 2120 & 2130) to control the cursor position.

The next interesting command is the LOAD D:DIRECT. SYS at line 200. When you give a LOAD command from the keyboard, it loads the new program over the old. You then have to type RUN. When a program issues a LOAD command, however, Pilot first NEWs memory, then LOADs the program and proceeds to RUN it. Neat! (At this time, there appears to be no way to overlay programs — aarrgh!)

'Nuff said about MENU.SYS. Except that you should also issue a SAVE D:FACE,1480,2210 command to save the routines which you'd have to type later when you enter DIRECT.SYS.

Onward! We're ready to enter DIRECT.SYS. Type it in (remembering to enter the control characters in line 280) up to line 1480. LOAD the FACE file to get lines 1480 through 2210 into DIRECT.SYS. Last, type lines 2220 through 2410 (remember control characters in line 2360). SAVE everything in a file called DIRECT.SYS. You can RUN this program to test it and see an animated mouth without a face (the face will be drawn by MENU.SYS). You should see a directory list down the right side of the screen.

Before we get into the details of DIRECT.SYS, let me explain a few design considerations. The whole system is designed to fit the non-typing, limited-reading user. Accordingly, I chose to turn on the red borders to keep interest up. The face is drawn in one program and the list in a second so that the first program will be very short and will load quickly. (If you want a single program, LOAD MENU.SYS then DIRECT.SYS. I numbered the two so that DIRECT.SYS will overlay and erase the unneeded commands in MENU.SYS. Although this will save a few seconds as you transfer files to a new disk, you'll wait a looong time before you see the list.) The list will include the first 20 files which don't end in the letters "SYS__". I skip those files since one almost never RUNs them. This keeps unneeded information off the screen.

I chose to present the 20 files and a face rather than more files to make things easy and friendly. The face is a warm welcome to our friends who may still be a little intimidated by the computer. And if you try, you can almost always get the really important files into the first 20. Yes, one could scroll the screen to see more. It's a feature which would be nice for more experienced users but which may not be so easy for the new guys. If you add one, let me know. Last, the dot between a file name and its extender is omitted so that you can use all 11 letters to make more useful program titles.

Frankly, friends, Pilot is not a good language for menu systems. There is no way to directly manipulate individual characters in a string without adding unwanted spaces, spaces which cannot be included in file names. The 65 lines of code starting at line 800 can be done in about 10 lines in BASIC. (After saying this, some 10-year-old whiz will find a 3-line method next week!)

DIRECT.SYS starts off in *INITIALIZATION by specifying that the variable $FILENAME is filled with 15 characters. This variable must be defined before all others so that it is the first variable in the list of variables kept by Pilot. In essence, Pilot stores all variables in special memory locations beginning at an address which is stored in the "word" located at 178. To Pilot, a word is two adjacent memory cells. It interprets these by multiplying the second value by 256 and then adding the first number. This allows the ATARI to talk to up to 64,000 memory locations. Line 2270 sets the variable #P (pointer) equal to the start of string space.

Each string is stored in the following format:

First 2 bytes	Length of the variable
Next 1 byte	Length of the variable name
Next x bytes	The variable name itself
Next 1 byte	Length of the data
Next y bytes	The data itself

After C:omputing $FILENAME in line 2240, we should find that the address pointed to by word 178 has a value of 27 (the length of the entire item) made up as follows:

ADDRESS ABOVE 178		VALUE
0 –	Length of item	27
1 –	Length of item	00
2 –	Length of name	08
2–10	Name	FILENAME
11–	Length of data	15
12–27	Data	DUMMYSPACESTO15

We're going to manipulate the value of the "length of data" byte to fool Pilot into believing that there are only 13 spaces in the variable. This will cut off the "sectors used" data for each file so that the list is a bit neater. Line 2280, then, adds nine to #P to move that value to the length of data pointer. (I know that the table above says to move 11 bytes to #P. The nine works — perhaps the first variable in the table is pointed to somewhat differently?) Its work done, *INITIALIZATION returns to the main program.

Line 270 sets Auxiliary 1 byte to the value of two meaning "open the disk to read the file directory" (Auxiliary 1 is the equivalent to "aexp1" in the OPEN command described in the DOS Reference Manual). We then begin reading file names. The READ command will send a formatted file name with eight characters (or blanks), three characters (or blanks) for the extender, and three numbers for the number of sectors, into the variable $FILENAME. By A:ccepting

$FILENAME, we can search for "FREE SECTORS", always the last entry in the directory, and for "SYS__" (lines 360 & 380). We J:ump to *FINI or to the loop, as appropriate, to skip the "SYS" items. This means that you can't end a file name in "SYS" (such as MYSYS.ONE) and still get it to show on the menu.

After we've found a good filename, line 420 does the magic. By C:omputing the data length byte to equal 13, we cut off the number-of-sectors data in positions 14, 15 and 16 and leave a formatted variable ready for T:yping in line 430 or 440. The extra blank between "#F" and " = " in line 430 compensates for the extra digit in file numbers greater than nine. Be sure to enter the control V before the #F and the control B after $FILENAME; they'll make a nice box around your list.

After getting your file number, DIRECT.SYS proceeds to read all the files again, skipping SYS files, to count to the number you requested. And the fun begins in *RUNNER at line 920. Basically, our problem is to insert a dot (period) between the file name and its extender, add the"D:" drive designation and then remove all blanks. This is a bear! First, we C:ompute the ASCII values for "D:" into the first two memory locations for the filename (see the BASIC Reference Manual, Appendix C).

Next, we make a space for the dot by moving the last character in the extender (position 13) to position 14, then position 12 to 13, and 11 to 12 (see *EXPANDLOOP). A simple C:ompute at position 11 (line 1170) inserts the dot.

The Atari Operating System requires that a valid file name contain no embedded blanks. Unless a file name is eight characters long, the file name read from disk will contain blanks. Your job, *DELETELOOP, should you care to accept it, is to locate the first blank space in the filename. Starting at line 1240, we inspect the values contained in the memory locations for the file name to see if any contain a blank (ASCII 32). If none do, the program J:umps to *LOADER. If a blank is found, the position is remembered and we move to the *MOVELEFTLOOP. This routine moves the value in position 11 (the dot from line 1170) into the blank space. It then moves the first extender value down, and loops until the entire extender is moved.

After all the moving is done, the program goes to *RUNNER which does only two things. The GR:aphic QUIT clears the screen and restores the borders to their usual color. LOAD loads the program you chose and runs it. Thereafter, any press of RESET will reload the menu programs and let you choose a new program by typing a simple number.

Looking through the string variable table can be a powerful (if complex) tool. One final point: strings are stored in ascending order by occurrence in the program. This means that the first string will have the lowest memory locations and will be pushed downward by later strings.

I hope you'll find the AUTO PILOT helpful and fun. My four-year-old calls the face "Bugs" — she likes her.

listing on page 118

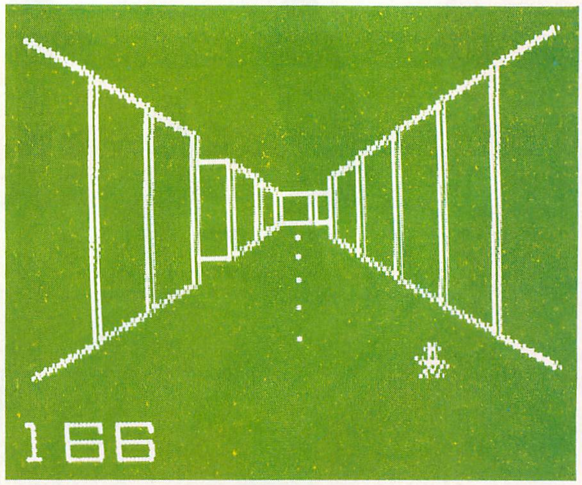
HAVE YOU FLOWN YOUR ATARI TODAY?



Imagine yourself at the controls of a small, single-engine plane, 10,000 feet in the air, on your approach to the runway and safety. You're running low on fuel, but your instruments show that you're on the glide path, and lined up with the runway. It's a beautiful, sunny day, and you can see the airport in the distance, across the grassy fields. But the crosswind is tricky, and it will take all your skill to land safely. You're coming down now, and the runway is getting closer. A bit left, OK, now lower the power, fine, now put down the flaps. Pull the nose up a bit more, you're a little low. Watch the power! Don't stall. OK. Here comes the runway. You hear the squeal of tires on pavement, your pulse quickens, you're down, but watch it, you're pulling right! Brakes, brakes! Left more! You've stopped safely! Good job. The first real-time flight simulator for ATARI is now available from MMG Micro Software. Written entirely in machine language, there are four levels of difficulty, landings in clear or foggy weather, landings with or without instruments, and with or without the real-time view from the cockpit. **Final Flight!** requires Atari 400/800, 24K, 1 joy stick, and is offered on tape or disk for the same suggested retail price of $29.95.

Final Flight! is available at your local dealer or direct from **MMG Micro Software.** Just send check or money order to P.O. Box 131, Marlboro, N.J. 07746 or for Mastercard, Visa, and C.O.D. deliveries call **(201)431-3472.** Please add $3.00 for postage and handling. New Jersey residents add 6% sales tax.

3-D MAZE



by DAVID BOHLKE

This game will place you in a gigantic random maze from which there is only one route of escape. In this three-dimensional simulation you'll only be able to see the high walls and the corridors fading in the distance. You must try to escape from the maze in the shortest possible time.

At the start of each game, you'll be asked to push the [SELECT] key to adjust the size of the maze. This level of difficulty can vary from a fairly simple 11 by 11 grid maze to an almost impossible 35 by 35 maze. When you press the START key, your random maze will be constructed on the screen; and you will then be placed inside of it.

To move through the maze, you will need to have a joystick plugged into Slot #1. Push the stick left / right to make a 90 degree turn left / right. Pushing the stick forward (up) will cause your man to move one intersection in the direction you are facing. After you move several steps, turn around 180 degrees and you'll see little 'tracks' in the intersection you just passed. These little markers will let you know where you have been.

The timer counting on the lower left of the screen will let you know how long you have been in the maze. The timer also increases by five each time you take a step. If you feel completely lost, you can press the fire button to see a top-down map of the maze. This will include a red path to signify where you have been; and a flashing marker to show your current location. Seeing this map does carry a penalty, though, as the timer will run about ten times its normal speed. Press the fire button a second time to return to the maze.

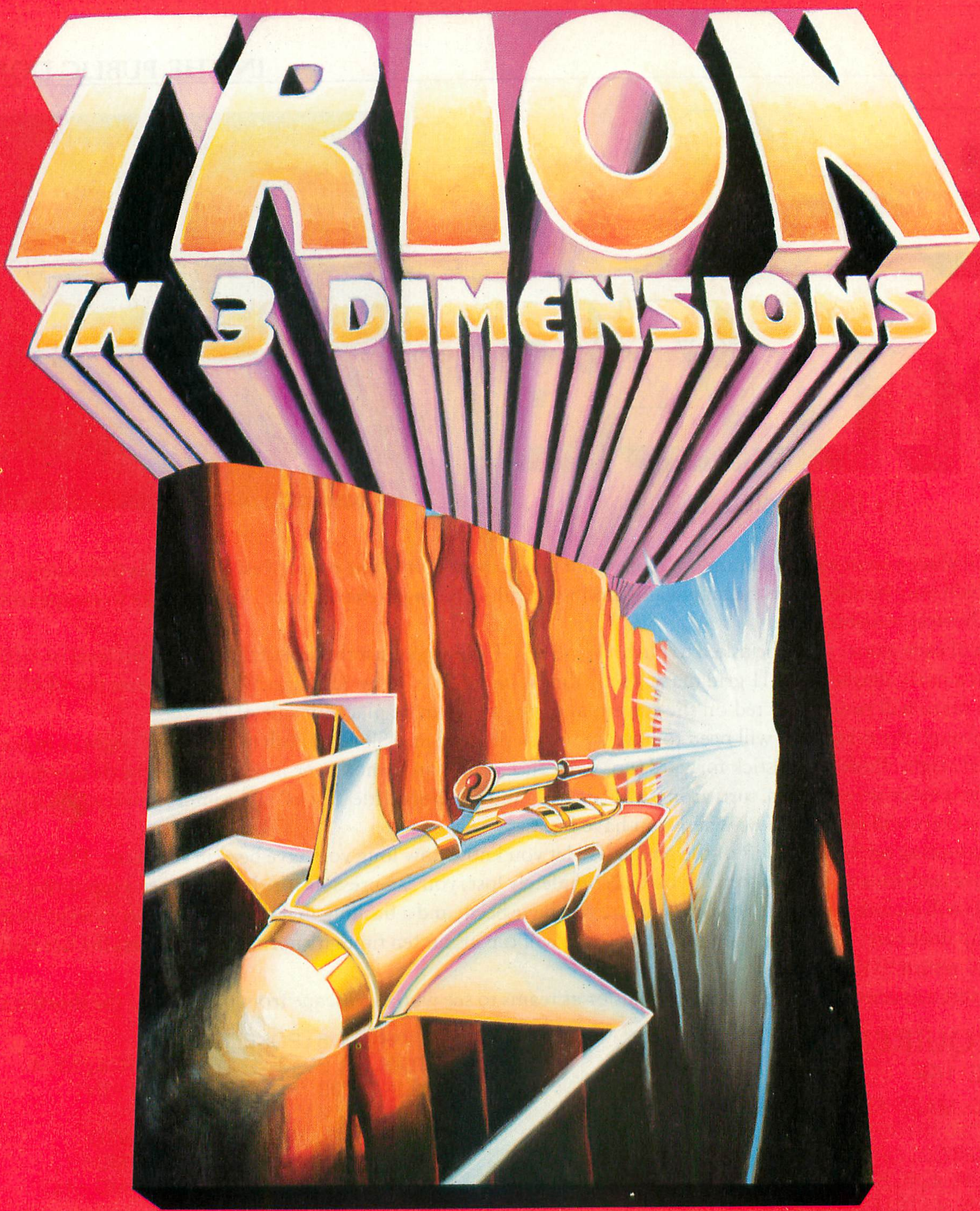
Several players can compete in turn as individuals or as teams to see who can escape from the maze in the shortest time.

RAM REQUIREMENTS

3-D MAZE 16K

```
10 REM 3-D MAZE ESCAPE (rev 12,22,82)
50 GRAPHICS 18:SETCOLOR
   4,0,8:SETCOLOR 2,7,10
51 SETCOLOR 4,0,8:SETCOLOR 2,7,10
52 POSITION 1,10:PRINT #6;"by
   DAVE BOHLKE
   ";:MD=11
55 POSITION 3,1:PRINT #6;
   "3-d maze escape"
60 POSITION 1,3:PRINT #6;
   " SELECT MAZE WIDTH,"
65 POSITION 1,5:PRINT #6;
   "THEN PRESS START ?"
70 IF PEEK(53279)=6 THEN 100
75 IF PEEK(53279)=5 THEN
   MD=MD+4:IF MD>35 THEN MD=11
85 POSITION 10,8:PRINT #6;
   " width ";MD
90 FOR I=1 TO 30:SOUND
   0,RND(0)*100,
   10,2:NEXT I:GOTO 70
100 GRAPHICS 5:POKE 752,1
102 SETCOLOR 2,13,4:SETCOLOR 4,13,4
110 XM=INT((38-MD)/2)+2:YM=INT
    ((38-MD)/2)
120 COLOR 2:PLOT XM,YM:DRAWTO
    XM+MD-1,YM:DRAWTO XM+MD-1,
    YM+MD-1:DRAWTO XM,YM+MD-1:
    DRAWTO XM,YM
150 PRINT
160 PRINT :PRINT
    "Intersection","       Reset"
200 DIM M(200),N(200)
210 K=0:M=INT(RND(0)*MD/3)*2+XM+2
215 N=INT(RND(0)*MD/3)*2+YM+2
220 PLOT M,N
240 LOCATE M+2,N,X:IF X=0 THEN 250
242 LOCATE M-2,N,X:IF X=0 THEN 250
244 LOCATE M,N+2,X:IF X=0 THEN 250
246 LOCATE M,N-2,X:IF X=0 THEN 250
248 GOTO 370
250 D=INT(RND(0)*4)+251:GOTO D
251 M1=-1:N1=0:GOTO 300
252 M1=0:N1=1:GOTO 300
```

continued on page 71



AT LAST! THE DEVASTATING NEW 3-D GAME!

Can you meet the challenges
of 3 totally unique 3-D screens?
TRION I. THE 3-D CANYON.
TRION II. THE 3-D TUNNEL.
TRION III. THE 3-D BARRIER.

You're gonna need all the ammo, all the fuel you can bag to survive the deadly incendiary ambush... the dangerous drone freighters... all the dynamic thrills of non-stop 3-D excitement. So hold on... Trion's gonna grab you!

ARCADE QUALITY
HIGH-RES GRAPHICS
100% MACHINE LANGUAGE
32K PLUS JOYSTICK
DISK OR CASSETTE

FROM THE MAKERS OF HOT LIPS, BUMPERBALL, AND SPACE ACE, #1-RATED GAME OF 1982*
$39.95. SEE YOUR DEALER OR ORDER DIRECT. SOON FOR IBM®!

London Software

374 Wildwood Ave., Piedmont, CA 94611
PHONE ORDERS: (415) 893-1090 VISA/MC

Please add $1.50 postage and handling.
Calif. residents add 6.5% sales tax.

*COMPUTER DEALER MAGAZINE, January, 1983

DESIGNED BY GREG YOUNG. FOR ATARI 400/800® AND YOU.

3-D MAZE *continued from page 69*

```
253 M1=1:N1=0:GOTO 300
254 M1=0:N1=-1
300 LOCATE M+M1*2,N+N1*2,X:IF X>0
    THEN 250
310 PLOT M+M1,N+N1:PLOT M+M1*2,N+N1*2
320 SOUND 0,M+N,10,4
330 M=M+M1*2:N=N+N1*2:
    K=K+1:M(K)=M:
    N(K)=N:POKE 656,
    2:POKE 657,16:PRINT K;
    " ";:GOTO 240
370 M=M(K):N=N
    (K):K=K-1:POKE 656,
    2:POKE 657,35:PRINT K;" ";
380 IF K=0 THEN 400
390 GOTO 240
400 COLOR 3:PLOT XM+1,YM+1:
    DRAWTO XM+MD-2,YM+1:DRAWTO XM
    +MD-2,YM+MD-2
402 COLOR 3:PLOT XM+1,YM+1:
    DRAWTO XM+MD-2,YM+1:DRAWTO XM
    +MD-2,YM+MD-2
403 DRAWTO XM+1,YM+MD-2:DRAWTO XM
    +1,YM+1
405 POKE 656,3:POKE 657,10:PRINT
    "Filling  Array . . .";
410 POKE 96,MD:POKE 97,XM:POKE 98,YM
412 CLR :DIM A$(1600):A$=" "
413 DIM N$(1),F$(1),W$(1),E$
    (1),L$(1),R$(1),U(8),D(8),R
    (8),L(8),P$(5)
414 N$=CHR$(0):F$=CHR$(1):W$=CHR$(2):
    E$=CHR$(3)
415 SOUND 0,0,0,0:GOSUB 2000
420 MD=PEEK(96):XM=PEEK(97):YM=
    PEEK(98)
430 FOR X=XM-1 TO XM+MD:FOR Y=
    YM-1 TO YM+MD
432 LOCATE X,Y,C:A$(Y*40+X,Y*40+X)=
    CHR$(C):COLOR C+6:PLOT X+40,Y
434 NEXT Y:SOUND 0,X*5,10,2:NEXT X
446 PT=PT+50
460 X=INT(RND(0)*(MD-7))+XM+3
462 Y=INT(RND(0)*(MD-7))+YM+3
464 IF A$(Y*40+X,Y*40+X)=W$ THEN 460
470 D=-40:R=1:L=-1:GOSUB 800
480 A=Y*40+X:A$(A,A)=F$
490 PT=0:POKE 752,1:POKE 77,0
500 S=STICK(0)
504 IF S=11 THEN GOSUB 950:GOTO 515
506 IF S=7 THEN GOSUB 970:GOTO 515
510 IF S=14 THEN 530
512 GOTO 517
515 GOSUB 800:PT=PT+1
517 SOUND 0,RND(0)*200,10,2:POKE 77,0
518 PT=PT+0.1
520 IF STRIG(0)=1 THEN 550
522 GOSUB 700:GOSUB 800:GOTO 500
530 A=Y*40+X:A=A+D:IF A$(A,A)=W$
    THEN 500
535 IF A$(A,A)=E$ THEN GOTO 650
540 Y=INT(A/40):X=A-40*Y:GOSUB 800
545 A=Y*40+X:A$(A,A)=F$
546 PT=PT+5
550 GOSUB 20000
590 GOTO 500
650 POKE 656,0:POKE 657,1:PRINT "
     You have  E S C A P E D  !!! "
651 POKE 656,2:POKE 657,22:
    PRINT "Press FIRE";
652 POKE 656,3:POKE 657,25:
    PRINT "to continue ?";
653 IF STRIG(0)=1 THEN SOUND 0,RND(0)
    *200,10,2:GOTO 653
654 RUN
700 GRAPHICS 5:SETCOLOR 4,0,8:POKE 752,
    1:PT=INT(PT)
702 SETCOLOR 2,0,8:POKE 752,1
705 PT=PT+10*MD
720 COLOR 1:PLOT X,Y
730 FOR M=XM+1 TO XM+MD-2:FOR N=
    YM+1 TO YM+MD-2
732 C=ASC(A$(M+N*40,M+N*40))
734 COLOR C:PLOT M,N
736 NEXT N:SOUND 0,M*5,10,2:NEXT M
780 PRINT :PRINT
    " Press  F I R E  to return . . . ";
782 PT=PT+1:POKE 656,0:POKE 657,23:
    PRINT " SCORE ";PT;
784 SOUND 0,RND(0)*200,10,2
786 IF STRIG(0)=0 THEN RETURN
790 IF PT/10<>INT(PT/10) THEN 782
792 IF C=1 THEN C=2:GOTO 795
794 C=1
795 COLOR C:PLOT X,Y
796 GOTO 782
800 GRAPHICS 7:POKE 752,1
801 SETCOLOR 2,13,4:SETCOLOR 4,13,4
802 SETCOLOR 1,5,10:SETCOLOR 0,13,12
805 A=Y*40+X
810 S=1:GOSUB 910
820 S=S+1:IF S=9 THEN RETURN
822 SOUND 0,S*20,4,2
825 COLOR 2:PLOT L(S),U(S):
    DRAWTO L(S),D(S)
826 PLOT R(S),U(S):DRAWTO R(S),D(S)
828 IF A$(A+D,A+D)=F$ THEN GOSUB 900
830 IF A$(A+L,A+L)=W$ THEN 840
834 COLOR 1:PLOT L(S),U(S):
    DRAWTO L(S-1)+1,U(S)
835 PLOT L(S),D(S)
    :DRAWTO L(S-1)+1,D
    (S):GOTO 850
840 COLOR 2:PLOT L(S),U(S):
    DRAWTO L(S-1),U(S-1)
842 PLOT L(S),D(S):DRAWTO L(S-1),
    D(S-1)
850 IF A$(A+R,A+R)=W$ THEN 860
```

continued on next page

```
854 COLOR 1:PLOT R(S),U(S):
    DRAWTO R(S-1)-1,U(S)
855 PLOT R(S),D(S):
    DRAWTO R(S-1)-1,D
    (S):GOTO 870
860 COLOR 2:PLOT R(S),U(S):
    DRAWTO R(S-1),
    U(S-1)
862 PLOT R(S),D
    (S):DRAWTO R(S-1),
    D(S-1)
870 IF A$(A+D,A+D)=W$ THEN 873
872 A=A+D:GOTO 820
873 COLOR 2:PLOT L(S),U(S):
    DRAWTO R(S),U(S)
874 PLOT L(S),D(S):DRAWTO R(S),D(S)
899 RETURN
900 I=ABS(R(S)-L(S))/2
905 COLOR 1:PLOT L(S)+I,D(S):RETURN
910 COLOR 2:J=69:I=RND(0)*90+35
912 PLOT I,J:DRAWTO I,J+5:DRAWTO
    I-2,J+7
914 PLOT I-1,J+1:PLOT I+
    1,J+1:PLOT I+1,J+
    6:PLOT I+2,J+7
916 PLOT I-3,J+3:DRAWTO I-
    2,J+4:DRAWTO I+2,J+4:
    DRAWTO I+3,J+5:RETURN
```



```
950 IF D=-40 THEN D=-1:R=-40:
    L=40:RETURN
952 IF D=-1 THEN D=40:R=-1:L=1:RETURN
954 IF D=40 THEN D=1:R=40:L=-40:RETURN
956 IF D=1 THEN D=-40:R=1:L=-1:RETURN
958 PRINT :PRINT "ERROR ":END
970 IF D=-40 THEN D=40:GOTO 954
972 IF D=1 THEN D=-1:GOTO 952
974 IF D=40 THEN D=-40:GOTO 950
976 IF D=-1 THEN D=1:GOTO 956
978 GOTO 958
2000 U(0)=-6:
     FOR I=1 TO 8:U(I)
     =U(I-1)+10-I:NEXT I
2010 D(0)=84:
     FOR I=1 TO 8:D(I)=D
     (I-1)-(10-I):NEXT I
2020 L(0)=-12:
     FOR I=1 TO 8:L(I)=L
     (I-1)+(10-I)*2-1:NEXT I
2030 R(0)=151:
     FOR I=1 TO 8:R(I)=
     R(I-1)-(9-I)*2-1:NEXT I
2035 FOR I=1 TO 8:L(I)
     =L(I)+14:R(I)
     =R(I)+14:NEXT I
2040 RETURN
20000 P$=STR$(INT(PT))
20040 FOR I=1 TO LEN(P$)
20050 POKE 656,1:POKE 657,I*3
20060 GOSUB VAL(P$(I,I))+20400
20070 NEXT I:RETURN
20400 ? "┏━┓↓←←← | |↓←←←┗━┛
      ";:RETURN
20401 ? " ┓ ↓←←← | ↓←←← ┻ ";:RETURN
20402 ? "┏━┓↓←←←┏━┛↓←←←┗━┛";:RETURN
20403 ? "┏━┓↓←←← ━┫↓←←←┗━┛ ";:RETURN
20404 ? "┳  ↓←←←┗━╋↓←←←  ┻ ";:RETURN
20405 ? "┏━┓↓←←←┗━┓↓←←←┗━┛";:RETURN
20406 ? "┏━┓↓←←←┣━┓↓←←←┗━┛";:RETURN
20407 ? "┏━┓↓←←←  |↓←←←  ┻";:RETURN
20408 ? "┏━┓↓←←←┣━┫↓←←←┗━┛";:RETURN
20409 ? "┏━┓↓←←←┗━┫↓←←←┗━┛";:RETURN
```

TYPO TABLE

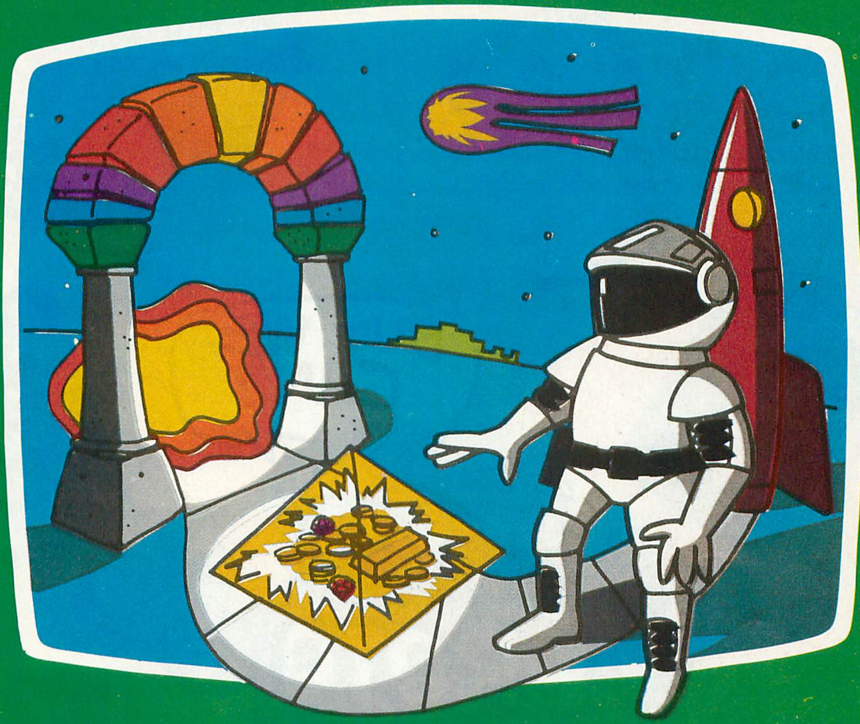
Variable checksum = 437610

Line num range	Code	Length
10 — 85	BQ	511
90 — 220	ZA	505
240 — 310	PF	440
320 — 405	AO	556
410 — 434	RJ	507
446 — 512	XJ	401
515 — 590	MH	364
650 — 732	DM	510
734 — 800	WC	391
801 — 835	YO	449
840 — 899	FX	441
900 — 954	SZ	512
956 — 2030	XK	593
2035 — 20404	VD	327
20405 — 20409	UH	145

JOURNEY TO THE PLANETS™

A space, adventure, and arcade action game for your ATARI® 400/800™ personal computer.

NEW



What is your favorite type of game; space, arcade, or adventure? "Journey To The Planets" presents an intriguing combination of all three as you find yourself on a strange planet in a strange universe. Luckily, the local gods are friendly and supply you with energy, a spaceship, and weaponry. In turn, you agree to search the universe for treasures for the gods. Board your ship, take off, accelerate through the upper atmosphere and out into space. Your flight should take you past many other inviting planets. With a slow approach and skilled maneuvering, you drop down through the planet's sky to a soft landing on its surface. Disembark and wander through several TV screens full of mystery and excitement. A different adventure awaits you on each planet.

Planetary adventures are designed to exercise your puzzle solving intellect, with arcade action thrown in to enhance the excitement. Although you are given as much time as necessary to solve each adventure, your score, which is based on many factors, favors those who are speedy.

After you capture all the treasures this universe has to offer, return to your adopted planet. Who knows, the gods may be so happy that you can convince them to send you back to your real home. You can't get there without their help!

Available from your local Atari retailer or send $29.95 in check or money order (California residents add 6½% sales tax) to JV Software Inc.

Atari® and 400/800™ are trademarks of ATARI, Inc.

A 32K assembly language program written for your ATARI® 400/800™ computer.

Other products by JV Software include Action Quest and Ghost Encounters, both 16K real time adventure games. Available on cassette or diskette for $29.95.

JV SOFTWARE, INC

3090 MARK AVE. SANTA CLARA, CA 95051

NOT EVERYONE CAN TEACH THEIR ATARI™ NEW TRICKS...



WE MAKE USING AND LEARNING ABOUT COMPUTERS FUN!

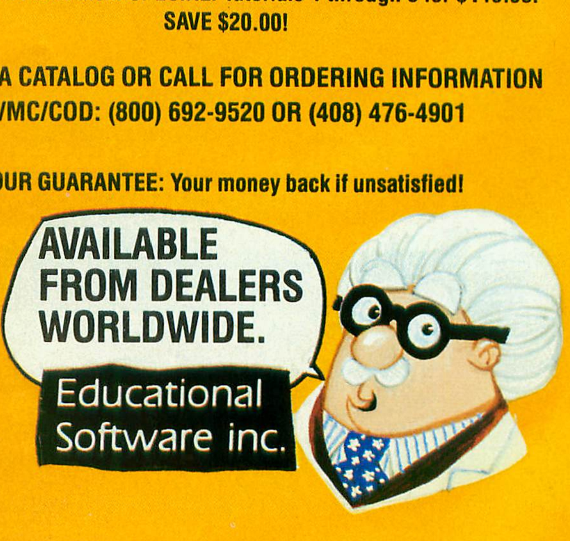
PROGRAMMING GUIDE FOR BEGINNERS OR EXPERTS — MASTER MEMORY MAP.™ A 32 page book with hundreds of hints on how to use your computer. Over 500 memory locations! $6.95.

LEARN SOUND AND GRAPHICS with our exciting lessons called **TRICKY TUTORIALS.™** Each comes with a tape or disk full of examples, and a 12 to 64 page manual written in an easy to understand manner. **#1 DISPLAY LISTS** — Put several graphics modes on your screen at once. **#2 SCROLLING** — Move text or graphics smoothly up, down, sideways, or diagonally. **#3 PAGE FLIPPING** — Change TV screens as quickly as flipping pages in a book. **#4 BASICS OF ANIMATION** — A beginner's lesson in animation using PLOT, PRINT, and a surprise game. **#5 PLAYER MISSILE GRAPHICS** — Learn the basics of writing your own arcade games. **#6 SOUND & MUSIC** — Simple methods to play complete songs, with graphics. Includes PLAYER PIANO free! **#7 DISK UTILITIES** — 7 programs to help you use your disk drive. 32K. **#8 CHARACTER GRAPHICS** — The best editor available with examples using special characters YOU CREATE and ANIMATE. **#9 GTIA, GRAPHICS 9 to 11** — New tricks you can do with these 16 color modes. **#10 SOUND EFFECTS** — Many examples, from rainfall to laser blasts, with ample explanation. **#11 MEMORY MAP TUTORIAL** — 30 colorful examples of tricks your computer can do.

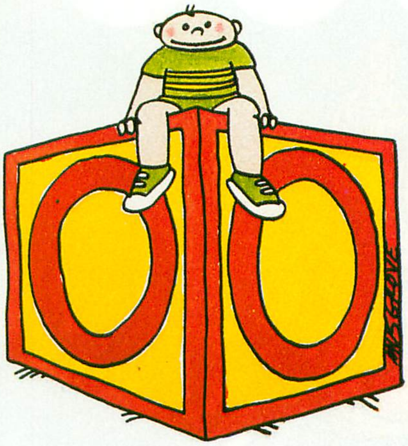
TUTORIALS 1 to 4 are $19.95 each. Numbers 5 to 11 are $29.95 each. 16K Tape or 24K disk. SPECIAL: Tutorials 1 through 6 for $119.95. SAVE $20.00!

WRITE FOR A CATALOG OR CALL FOR ORDERING INFORMATION
VISA/MC/COD: (800) 692-9520 OR (408) 476-4901

OUR GUARANTEE: Your money back if unsatisfied!



4565 Cherryvale Ave., Soquel, Ca. 95073



ALPHA BLOX

by LINDA SCHREIBER

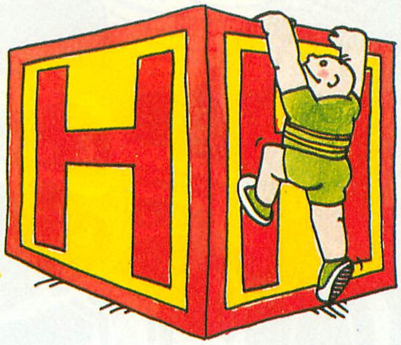
Alpha Blox will appeal to adults as well as children. It is a double purpose program. First, it reinforces the alphabet sequence for youngsters. The "game" is to locate all the letters of the alphabet in the correct order, beginning with 'A' and ending with 'Z'.

It is also a "concentration"-type game. The letters are placed randomly behind the different blocks. None of the blocks are marked. By pressing the arrow keys, you can move the cross-hairs over a different block. To see the letter under the block, press the space bar. Do *not* use the shift or control keys for the arrow keys. The program is designed for small children who might become confused by the need to combine keys to make the cross-hairs move.

The game is designed for one or two players. When the game begins, the first player 'looks' for the 'A' by placing the cross-hairs over a block and pressing the space bar. When the 'A' is found, two points are added to the score. In a two-player game, after a successful move the player can look for the next letter. Each time the correct next letter is found, points are added to that player's score. Points are increased by two after every correct letter, so if you found A, B, and C without a miss, you would accumulate ten points. If you miss a letter, the point value returns to two for the next player. No points are subtracted from a player's score for a wrong letter.

When a letter is found, the block becomes 'empty' and the letter will move to the bottom left of the screen. Only the score of the person that is playing will be displayed.

When all the letters have been found, the player with the most points wins. In the single player version, that player's score is shown on the screen.

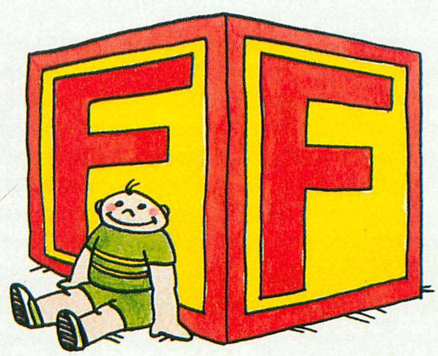


Educationally, Alpha Blox has several advantages. It rewards letter recognition and exercises spatial and sequential memory, at which many children are quite as capable as adults. In a competition between parent and child, the parent needn't always cheat to lose. Also, the scoring makes it possible for many points to be scored late in the game to make up for failure to score early. As a result, Alpha Blox should be truly fun for small children to play with grown-ups or older children.

RAM REQUIREMENTS

ALPHA BLOX 8K

```
10 REM ALPHA-BLOX FOR
   ANTIC MARCH 1983
20 REM BY L.M.SCHREIBER
   FOR TAB BOOKS
30 DIM UP$(13),
   DOWN$(13),P1$
   (20),NAM$(20),AL$
   (27),SCORE(2)
40 CBAS=PEEK(106)-8:POKE
   204,CBAS:POKE 206,224:
   PMBASE=CBAS*256:REM
   SET UP THE MEMORY FOR
   CHARACTERS & P/M
   GRAPHICS
50 FOR X=1 TO 13:READ B:
   UP$(X,X)=CHR$(B):NEXT
   X:REM MACHINE LANGUAGE
   SUBROUTINE TO MOVE UP
60 DATA 104,160,0,200,177,
   205,136,145,205,200,
   208,247,96
70 FOR X=1 TO 13:READ B:
   DOWN$(X,X)=CHR$(B):
   NEXT X:REM MACHINE
   LANGUAGE SUBROUTINE
   TO MOVE DOWN
80 DATA 104,160,255,136,
   177,205,200,145,205,136,
   208,247,96
90 FOR X=1 TO 20:READ B:
   P1$(X,X)=CHR$(B):NEXT
   X:REM MACHINE
   LANGUAGE SUBROUTINE
   TO MOVE CHARACTER SET
```



continued on page 77

ARENA 3000

BY SIMON SMITH



Three hundred years in the future, the gaming grids are dominated by the human/machine hybrids known as cyborgs. As the newest achievement of the cybernetic sciences, your final testing demands that you battle, and defeat, the most dangerous robotics in the universe. Humanoid robots, killer hyper-spheres and giant spider creatures test your relays. Up to forty enemies converge on you as you frantically fire your arm pistol. As you clear each arena, your opponents move faster, take more hits, and mutate into additional nightmarish creations.

Arena 3000 can be played with one or two joysticks. One joystick moves your cyborg, the other fires your energy weapon. With one joystick, the joystick button fires your pistol. Arena 3000 has full color mode 7.5 graphics, incredible sound effects, one or two player options, and one or two joystick control. It saves high scores and pauses with the touch of a button. We guarantee that Arena 3000 is one of the fastest, most exciting games you'll ever play on your Atari, or return it within 14 days for a full refund.

ARENA 3000 Atari 400/800 16K cassette .$29.95 *ARENA 3000 Atari 400/800 16K diskette .$29.95*

Please add $2.00 for first class postage, $4.00 for overseas air mail.

Med Systems Software • PO Box 3558 • Chapel Hill, NC 27514

To order, call: 1-800-334-5470, or see your dealer

ALPHA BLOX *continued from page 75*

```
100 DATA 104,162,4,160,0,
    177,205,145,203,200,208,
    249,230,206,230,204,
    202,208,242,96
110 Q=USR(ADR(P1$)):REM
    MOVE THE CHARACTERS
120 FOR X=24 TO 95:READ B:
    POKE PMBASE+X,B:
    NEXT X:REM REDEFINE
    SOME CHARACTERS
130 DATA 255,255,255,255,
    255,255,255,255
140 DATA 255,255,192,192,
    192,192,192,192
150 DATA 192,192,192,192,
    192,192,192,192
160 DATA 192,192,192,192,
    192,192,255,255
170 DATA 255,255,3,3,
    3,3,3,3
180 DATA 3,3,3,3,3,3,3,3
190 DATA 3,3,3,3,3,3,
    255,255
200 DATA 255,255,0,
    0,0,0,0,0
210 DATA 0,0,0,0,0,0,
    255,255
220 FOR X=PMBASE+512 TO
    PMBASE+768:POKE
    X,0:NEXT X:REM
    CLEAR MEMORY FOR
    PM GRAPHICS
230 REM USE SUBROUTINE
    TO PLACE CROSS-
    HAIR IN PM MEMORY
240 BC=528:GOSUB 2000
250 TRAP 250:? "⇱
    ":? :? :? :?
    "HOW MANY PLAYERS
    (1 OR 2)";:INPUT
    P:REM CLEAR SCREEN -
    LOWER THREE LINES
260 IF P<1 OR P>2 THEN 260
269 REM CLEAR NAM$ -
    20 SPACES
270 NAM$=
    "                    ":
    FOR X=1 TO P:? :? :? :
    ? "PLAYER #";X:?
    "PLEASE ENTER
    YOUR NAME"
280 INPUT P1$:IF P1$=""
    THEN 280
290 IF LEN(P1$)>10 THEN
    P1$=P1$(1,10):REM
    LIMIT THE NAME TO
    10 CHARACTERS
300 NAM$(X*10-9,X*10)=
    P1$:NEXT X:REM
    PLACE BOTH NAMES IN
    THE SAME STRING
310 GRAPHICS 17:POKE
    756,CBAS:
    REM USE NEW
    CHARACTER SET
320 POKE 704,10:POKE 559,
    46:POKE 53277,3:
    POKE 54279,CBAS:REM
    ENABLE PM GRAPHICS
330 VER=1:HOR=1:HORZ=56:
    PLHOR=53248:REM
    POSITION OF CROSS-
    HAIRS AND
    REGISTER TO POKE
340 FOR B=0 TO 19 STEP 4:
    FOR X=0 TO 16 STEP 4:
    REM POSITIONS
    FOR THE BLOCKS
350 POSITION X,B:? #6;
    "###":POSITION
    X,B+1:? #6;
    "###":POSITION
    X,B+2:? #6;
    "###":NEXT X:
    NEXT B:REM PRINT
    THE BLOCKS
360 POSITION 8,
    20:? #6;"###":
    POSITION 8,21:?
    #6;"###":
    POSITION 8,22:?
    #6;"###";:
    REM 26th BLOCK
370 AL$=
    "abcdefg
    hijklmn
    opqrstu
    vwxyz":
    
    REM *** IMPORTANT!!
    *** TYPE ALPHABET
    IN LOWER CASE
    INVERSE VIDEO
380 FOR B=1 TO 3:FOR X=1
    TO 26:Q=INT(RND(1)
    *(26-X+1))+1:
    REM GET A LETTER
390 AL$(27,27)=
    AL$(Q,Q):AL$
    (Q,Q)=AL$
    (26-X+1,26-X+1):
    AL$(26-X+1,26-X+1)
    =AL$(27,27):
    REM MIX UP THE LETTERS
400 NEXT X:NEXT B
410 SCORE(1)=0:
    SCORE(2)=0:
    COUNT=2:PL=1:
    POKE 206,INT
    (PMBASE+512)/256:
    POKE 205,0:CHAR=65:
    REM SET THE VARIABLES
420 POKE PLHOR,HORZ:
    POSITION 12,20:?
    #6;NAM$(PL*10-
    9,PL*10-4);:
    POSITION 14,22:?
    #6;"    "
430 POSITION 14,22:?
    #6;SCORE(PL):OPEN
    #2,4,0,"K:"
440 POKE 764,255:GET #2,
    B:CLOSE #2:IF B>127
    THEN B=B-128:POKE
    694,0:REM RESET
    INVERSE FLAG
450 IF B=32 THEN POKE
    PLHOR,0:GOTO 620
460 IF B=42 THEN 520:
    REM GO RIGHT
470 IF B=43 THEN 540:
    REM GO LEFT
480 IF B=45 THEN 590:
    REM GO UP
490 IF B=61 THEN 560:
    REM GO DOWN
500 GOTO 430:
    REM NOT A GOOD KEY
510 REM IF A SPACE,
    OPEN THE BLOCK,
    OTHERWISE JUST MOVE
    THE CROSS-HAIR
520 HOR=HOR+1:HORZ=
    HORZ+32:IF HORZ>185
    THEN HORZ=56:HOR=1
530 POKE PLHOR,HORZ:
    GOTO 430
540 HOR=HOR-1:HORZ=
    HORZ-32:IF HORZ<56
    THEN HORZ=184:HOR=5
550 GOTO 530
560 VER=VER+1:IF VER=6
    AND HOR<>3
    THEN BC=528:LS=592:
    GOSUB 1090:
    VER=1:GOTO 430
570 IF VER=7 AND HOR=3
    THEN BC=528:LS=608:
    GOSUB 1090:VER=1:
    GOTO 430
580 FOR X=1 TO 16:Q=USR
    (ADR(DOWN$)):
    NEXT X:GOTO 430
590 VER=VER-1:IF VER=0
    AND HOR=3
    THEN BC=608:LS=528:
    GOSUB 1090:
    VER=6:GOTO 430
600 IF VER=0 AND HOR<>3
    THEN BC=592:LS=528:
    GOSUB 1090:VER=5:
    GOTO 430
610 FOR X=1 TO 16:Q=USR
    (ADR(UP$)):NEXT X:
    GOTO 430
620 X=(HOR-1)*4:
    B=(VER-1)*4:
    LOCATE X+1,B+1,Q:
    IF Q=32 THEN 420
630 POSITION X,B:?
    #6;"$*'":
    POSIION X,B+1:? #6;
    "% (":POSITION X,
    B+2:? #6;"&+)"
```

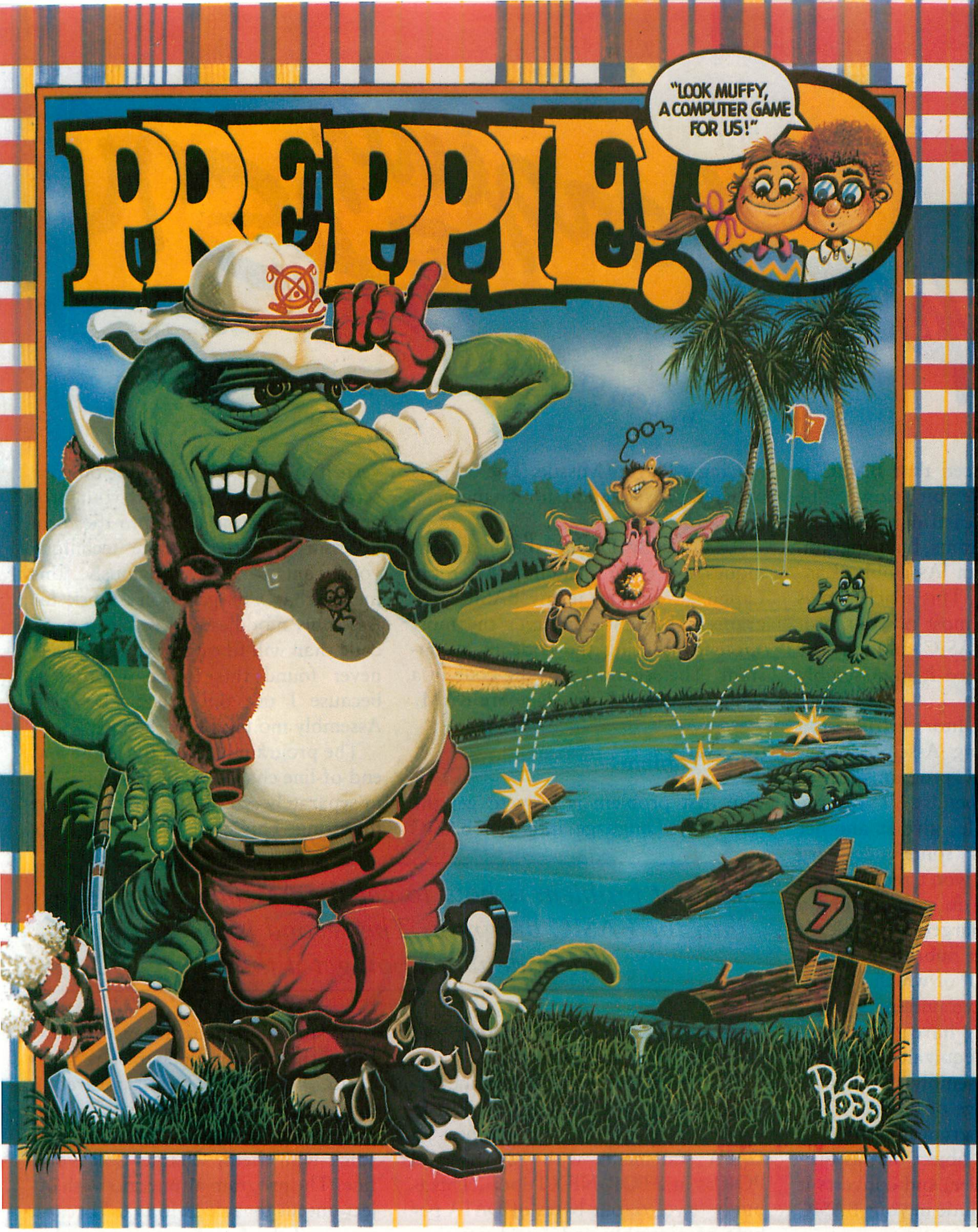
continued on next page

```
640 POSITION X+1,B+1:
    IF HOR=3 AND VER=6
    THEN ? #6;
    AL$(26,26):
    AS=ASC(AL$(26,
    26)):GOTO 660
650 AS=ASC(AL$((VER-1)
    *5+HOR,(VER-1)*5+
    HOR)):? #6;CHR$(AS)
660 FOR Q=1 TO 200:
    NEXT Q:IF AS-160<>
    CHAR THEN 1050
670 IF AS-160
    =CHAR THEN SOUND
    0,25,10,10:POSITION
    X+1,B+1:? #6;
    " ":B=20:
    X=CHAR-64:IF X>6
    THEN X=X-6:B=B+1
680 IF X>6 THEN X=X-6:
    B=B+1
690 IF X>6 THEN X=X-6:
    B=B+1
700 POSITION X,B:?
    #6;CHR$(CHAR+32):
    CHAR=CHAR+1:SCORE
    (PL)=SCORE(PL)+
    COUNT:COUNT=COUNT+2
710 FOR Q=1 TO 100:
    NEXT Q:SOUND 0,0,0,0:
    IF CHAR<>91 THEN 420
720 POSITION 0,0:? #6;
    "⬉":POSITION 2,8:
    FOR X=1 TO P:? #6;
    NAM$(X*10-9,
    X*10);" = ";SCORE(X)
730 POSITION 2,10:NEXT X
740 POSITION 2,12:?
    #6;"TO PLAY
    AGAIN        PRESS P"
750 POSITION 2,15:? #6;
    "TO QUIT
                 PRESS Q"
760 OPEN #2,4,0,"K:"
770 GET #2,B:CLOSE #2:
    IF B>127 THEN B=B-128:
    POKE 694,0
780 B=B-80:IF  NOT B THEN
    GOTO 250
790 IF B THEN END
800 GOTO 760
1050 SOUND 0,100,
    10,10:FOR Q=1 TO
    100:NEXT Q:POSITION
    X,B:? #6;"###":
    POSITION X,B+1:? #6;
    "###"
1060 POSITION X,B+2:?
    #6;"###":SOUND
    0,0,0,
    0:IF P=2 THEN PL=3-PL
1070 COUNT=2:GOTO 420
1090 FOR X=LS TO LS+10
    :POKE PMBASE+X,0
    :NEXT X:REM ERASE
    LAST CROSS HAIR
2000 RESTORE 2020
    :FOR X=BC TO BC+10
    :READ B:POKE PMBASE+
    X,B:NEXT X:
    REM PLACE CROSS-HAIR
    IN PM GRAPHICS
2010 RETURN
2020 DATA 24,24,24,24,0,231,
    0,24,24,24,24
```

TYPO TABLE

Variable checksum = 575132

Line num range			Code	Length
10	–	80	IC	548
90	–	200	JB	524
210	–	290	EI	530
300	–	350	XA	519
360	–	410	LA	647
420	–	510	AP	559
520	–	600	TF	567
610	–	670	GY	621
680	–	750	LH	518
760	–	2000	QR	536
2010	–	2020	JA	43

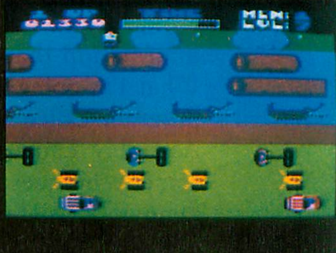


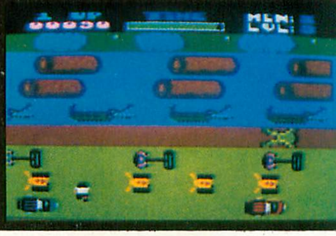
PREPPIE II IS HERE!

That's right you LaCoste-clad Atari owner. Wadsworth Overcash, our Weejuned young prepster continues his exploits — this time at college and just like daddy, he's decided to pledge a fraternity. Have we got surprises for him (and you)!

AVAILABLE NOW AT FINE COMPUTER STORES EVERYWHERE

by Russ Wetmore





Good Golly! What A GAME!

The original arcade game **PREPPIE!** will give you hours of toe-tickling fun. **You** take the controls, moving your young prepster about on the golf course. And what a golf course! It's unlike any you have ever played on before. There are dangers **everywhere,** and only you can keep the little Ivy Leaguer from a fate worse then Penn State!

PREPPIE! is written in state-of-the-art machine language, is joystick compatible and fully utilizes the Atari's sound and graphics capabilities. Quite frankly, it will give you the most fun you can have on an Atari microcomputer.

PREPPIE! is available at fine computer, book, and hobby stores everywhere.

An exclusive game from

ai Adventure INTERNATIONAL

A DIVISION OF SCOTT ADAMS, INC.

To order, see your local dealer. If he does not have the program you want, then call 1-800-327-7172 (orders only) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a division of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917

"My Atari never did things like this before!"
—*Holister Townsend Wolfe*

"I had so much fun I almost blew my doughnuts."
—*Theodore Boston III*

"I haven't had this much fun since Buffy and I went to Princeton for the weekend."
—*Martha Vineyard*

Supercharging BASIC

by BOB STEWART

You probably noticed that BASIC is sometimes a little bit slow. The Assembler Editor cartridge can help speed up your programs, but programming completely in Assembly Language is a real drag. This article shows you how to write most of your program in good-old BASIC, and only the parts that really need it in Assembly Language.

The Assembler Editor cartridge is a fine tool for adding Assembly Language to your BASIC programs. If you haven't read Appendix 9 of the Manual for a while, give it another look. It contains some necessary information that I won't repeat here. What I'm going to do is pass along a program called Charger, a couple of Assembly Language subroutines, and some techniques, all of which I use in my own ATARI programming work. I assume you already have the Assembler Editor (or equivalent), some knowledge of Assembly Language, and a fair knowledge of BASIC.

The Charger program is written in BASIC. It reads an object file, as output by the Assembler, and converts it to lines you can include in your BASIC program.

The subroutines provided are the two that I use most often. One is a byte mover, good for things like copying a character set from ROM to RAM, or placing a Player / Missile. The other is a byte sprayer, good for changing a chunk of memory.

Additionally, I'll describe three techniques I use for installing Assembly Language routines in my BASIC programs. The first conserves the most space by putting the code in a constant. The second keeps the code in a string. The third uses Page Six RAM.

Bob Stewart is propietor of The Logic Smiths, Groton, Mass., a software development company specializing in Atari products. The main product so far is The Next Step, *offered by On-Line Systems (see* ANTIC, *#5, p. 42). Bob has been programming and designing software for 13 years.*

The Problems

The first problem is how to get the Assembly Language into the BASIC program. The second is where to put the code when you get it there.

The first problem is how to get the Assembly Language into the BASIC program. The second is where to put the code when you get it there.

The technique most magazine articles use to put Assembly code in BASIC is to use lots of numbers in DATA statements with READs and POKEs in a FOR-NEXT loop. This is bulky (two to four bytes of DATA per byte of assembly code) and not very fast. I prefer the ATARI's ability to treat almost every binary byte from 0 to 255 as a typeable, displayable character. So, I put my Assembly code into an ordinary BASIC string. There is just one little difficulty with this. There are two values, the quotation mark (ATASCII value 34) and the end-of-line (ATASCII 155), that cannot be put between the quotes that delimit a string. This matter is also resolved.

The Charger program reads an Assembler object output file and converts it to lines of BASIC code on your screen. You can then load your program and edit the lines into the form necessary for the storage technique you want to use. Obviously, this means that Charger won't work for Assembly modules that result in more code than will fit on the screen. I have never found this to be a problem because I use only relatively small Assembly modules with BASIC.

The program handles the quote and end-of-line characters by tucking them in separately after it sets up the rest of the string. This special treatment costs some space and inconvenience, but I've found that these two characters rarely occur. When they have appeared, a minor code or data change usually made them go away. But, if you're stuck with them, Charger still works fine. The program also works with object output that skips forward because you used the *= directive more than once. The only restriction is that the code segments must be in ascending order.

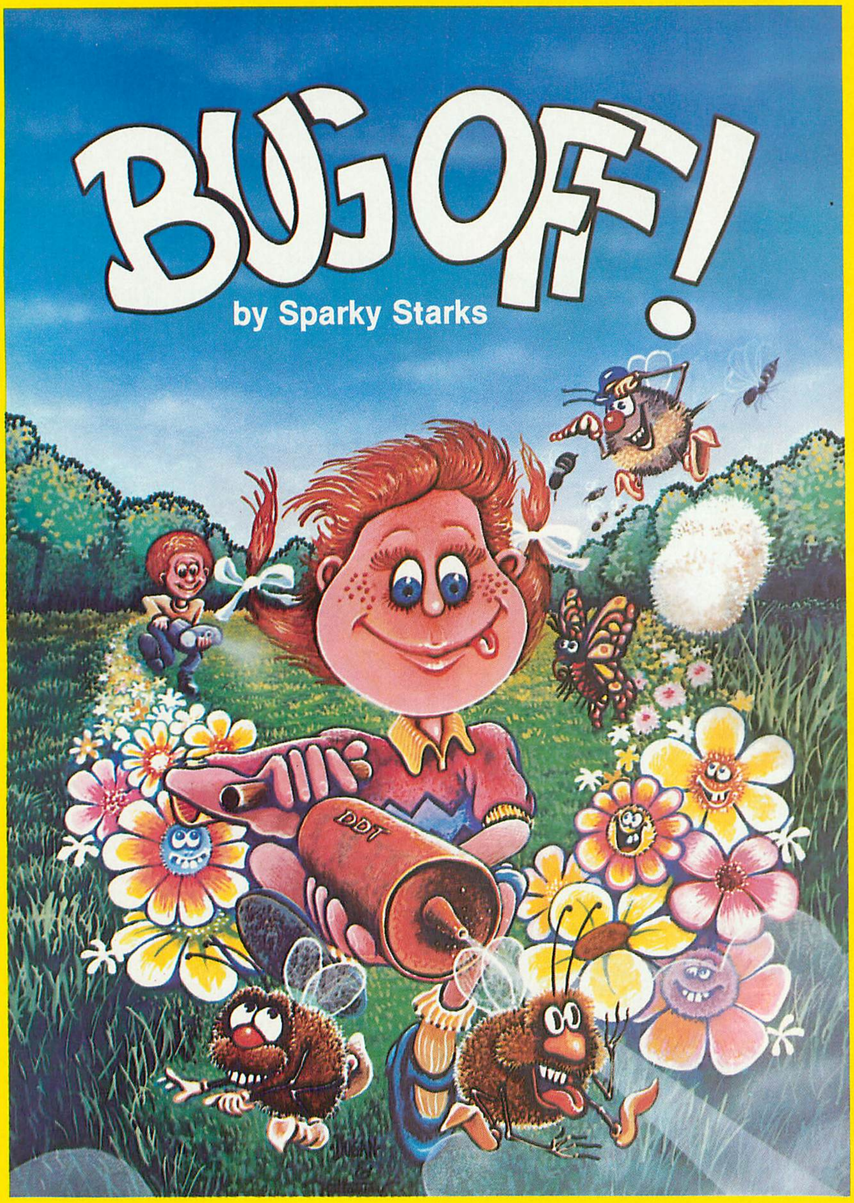
The Program

Now we'll look at Charger. First, a few notes on programming style. Since this program has no memory problems, and since I intended it to be readable, I kept most statements on separate lines. I did something that's *not* a good idea if you ever plan to shrink a program by

continued on page 83

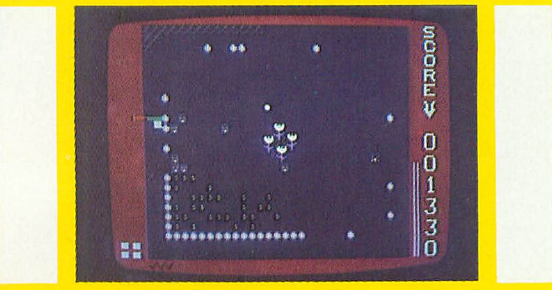

"...faithfully captures the look, spirit and play of arcade 'Space Invaders'".
-John Anderson, Creative Computing
"All are excellent versions of the arcade games with super graphics and sound."
-Mark Benioff A.N.A.L.O.G.
"The graphics display, sounds and game logic are so close to the original, that you might find yourself looking for the coin slot on your computer."
-Gary and Marcia Rose
"'Deluxe Invaders' is by far the best Space Invaders program ever released for a personal computer."
-Leigh Goldstein, Electronic Games
MIDWAY
Wizard of Wor
Deluxe Invaders
GORF
Roklan Software
We are Serious About Our Games!

YOU'RE GOING TO HAVE FUN WITH YOUR ATARI!!



AND THE FUN GETS ROLLING WITH BUG OFF!

Yikes! The bugs are swarming here, there and everywhere and only a strong whiff of DDT can put 'em away. The object of the game is to control the seven different kinds of pests that are running helter-skelter over everything. The Army can airlift in more DDT to fill your bug sprayer . . . but will they make it in time?



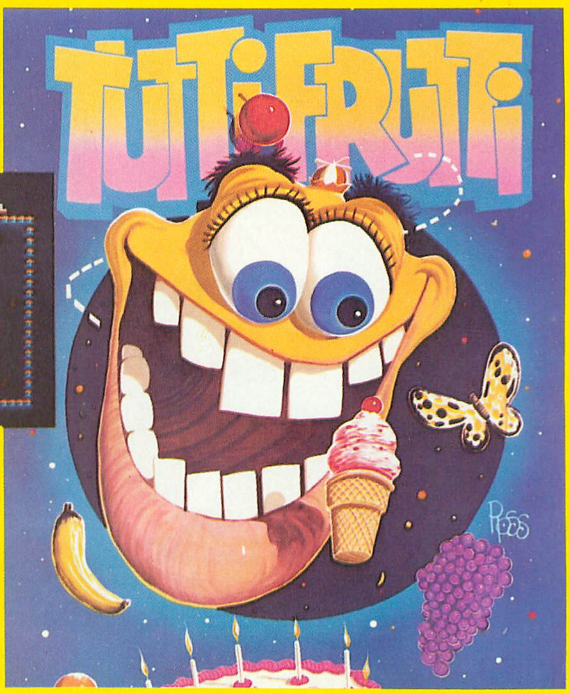
The action builds to a furious frenzy as an awesome assortment of insects attack anything and everything in sight. A definite case of "spray first and ask questions later." All this and hi-res graphics, too!

16K TAPE	050-0167	$29.95
32K DISK	052-0167	$29.95

TUTTI FRUTTI — by Alan Newman

"GRAPE FUN" FOR THE WHOLE FAMILY!

Somewhere between Never Never Land and next Thursday, there's a wild and wacky place where your joystick-controlled "Hungry" snacks on an orchard of goodies. But there are some nasty ol' bugs who'd just as soon snack on YOU, so look sharp and beware. **Fun**tastic action for all ages!



TUTTI FRUTTI ... Wow! A crazy cast of characters in vivid hi-res color all performing in their natural habitat, otherwise known as TUTTI FRUTTI Land. Grape fun for ages 6 and up!

16K TAPE	050-0160	$24.95
32K DISK	052-0160	$24.95



Adventure INTERNATIONAL

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.

Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917

PRICES SUBJECT TO CHANGE

SUPERCHARGING BASIC

continued from page 80

removing the REMarks. In several places I did GOTO a REMark. The best technique in the program is breaking code into logical sections with the line numbering. This makes BASIC programs easier to write and modify.

Lines 1000–1040 are initialization. FILE$ and TEMP$ are for the file name input code. BLOCK$ is for keeping track of undisplayable characters. Q$ is simply a quote character to make the PRINTing of code lines look cleaner. BEGIN is to become the beginning code address for a later error-check, here I initialize it to a recognizably invalid value.

Lines 1100–1160 get a file name. If the input is empty, I default the name to one I often use.

Lines 1200–1260 add the disk-file device name if you don't furnish one.

Lines 1300–1340 add the "official" object-file extension if you don't feel like typing it.

Lines 1400–1450 attempt to OPEN the file. If the OPEN fails, these display a simple error message and let you try again.

Lines 1500–1540 insist that the first two bytes of the file are the values that the Assembler always uses to start an object output. If so, they clear the screen and enable the display of control characters. The curved arrow symbol in line 1530 stands for the "clear screen" character. To get the correct character into your program, type ESCape and CTRL-CLEAR.

Lines 1600–1680 begin the main file-reading loop. At this point the first two bytes are the low- and high-order bytes of the starting memory address (FIRST) of the code segment. The next two are the ending address (LAST). Line 1660 computes the number of bytes in the code segment (COUNT).

Lines 1700–1960 print the code lines. Line 1710 computes the proper index into our output string. That string will contain all the byte values and will display as a strange-looking bunch of characters ("lots of funny stuff"). Lines 1740 and 1750 limit the displayed lines of code to 80 string characters. The WEIRD flag is used to mark a "quote" or "end-of-line" value. The loop from 1770 to 1860 reads the bytes and displays them. If it finds a weird one, it puts a "period" on the screen and remembers the value and position in BLOCK$. Line 1870 finishes the string. Lines 1880 through 1930 check for and handle the weird characters by displaying lines to insert them in the string as CHR$ values.

Lines 2000–2050 do normal end processing. Line 2010 saves the current cursor position. Lines 2020 and 2030 put a DIMension statement for our string at the top of the screen.

Lines 2100–2210 print error messages. We get to them from TRAPs or GOTOs back in the main code.

Lines 2300 through 2330 change control-character display back to normal and clean up. Line 2330 clears the program out of memory.

The Subroutines

I've included two Assembly Language subroutines, MOVE and SPRAY. MOVE puts Assembly code where you want it. SPRAY is great for zeroing your Player/Missile memory before you use it.

The Techniques

There are three Assembly code storage techniques that I use. Each has its advantages. For the explanations, assume that the Charger program left the following lines on your screen:

```
9999 DIM CODE$(62)
9999 CODE$(1)=
        "lots of funny stuff"
```

MOVE puts Assembly code where you want it. SPRAY is great for zeroing your Player/Missile memory before you use it.

To add the Assembly code to your BASIC program, you can either LOAD it and then edit the lines, or you can edit them, LIST them to a file, and ENTER them into your program. I'll just explain how you would edit the lines for whichever storage technique you want.

The first technique saves the most memory. It results in only one copy of the Assembly code in your BASIC space. The code must not have any absolute address references within itself. You can't use a JMP or LDA instruction with an absolute address within your Assembly Language module. Set a variable equal to the address of a string constant containing your code. You would not need the DIM line at all. You would edit the other to look like:

```
9010 SPRAY=ADR
        ("lots of funny stuff")
```

You have named your module SPRAY. SPRAY is the address you would use in, for example, a USR function as the address of the code to run. A slight variation is to use ADR on the string constant right in the USR function.

Be careful BASIC doesn't move things around and invalidate your address. I've never had a problem with that, but I always do all my DIMensions and initialize such addresses at the beginning of execution.

The first technique has no clean way to handle the unprintable characters. The second technique can, but results in a wasted copy of your Assembly code. In the second technique, you put the code into a string variable and execute it from there. This requires the same restriction on absolute addresses, but it lets you tuck the weird characters in where they belong. You would edit the lines something like this:

```
1010 DIM SPRAY$(62)
1015 SPRAY$(1)=
        "lots of funny stuff"
```

You might also add a line to set SPRAY to the ADR of SPRAY$, or simply use ADR(SPRAY$) as the address when you need it. My example didn't need this technique; it had no weird characters. If it did there would have been a line like CODE$(5,5)=CHR$(155).

The third technique handles weird characters okay. It wastes a copy of the code, but has the advantage of allowing absolute addresses if you put the code into a fixed place, like Page Six. You use the MOVE routine for this one.

continued on next page

You can use a combination of the first two techniques to accomplish the third. MOVE the code to where you want it. MOVE can be in a constant or a variable. It might look like this:

```
9010 MOVE=ADR
     ("MOVE's funny stuff")
9020 DIM CODE$(62)
9022 CODE$(1)=
     "lots of funny stuff"
9024 TEMP=USR(MOVE,ADR
     (CODE$),1536,LEN
     (CODE$))
```

In this case, the code will go to Page Six (1536 decimal destination address). TEMP is any unneeded variable, since MOVE returns no value.

```
0100  .TITLE "MOVE for BASIC - 21 May 1982"
0110 ;
0120 ; BASIC callable subroutine to move
0130 ; any number of bytes.
0140 ;
0150 ; By Bob Stewart, of The Logic Smiths
0160 ; For ANTIC Magazine
0170 ;
0180 ; Calling sequence:
0190 ;
0200 ;   XX=USR(MOVE, INADD,OUTADD,COUNT)
0210 ;
0220 ;     XX     - Any useless variable
0230 ;     MOVE   - Address of MOVE code
0240 ;     INADD  - Input address
0250 ;     OUTADD - Output address
0260 ;     COUNT  - Number of bytes to move
0270 ;
0280 ; Notes:
0290 ;
0300 ;  Input area should not
0310 ; overlap output area.
0320 ;Uses page 0 for
0330 ; temporary storage at 204-209.
0340  *=$600 Actually relocatable
0350 ;
0360 ; Page 0 Temporary Storage
0370 ;
0380 INADD=204 Input address
0390 OUTADD=206 Output address
0400 COUNT=208 Byte count
0410 ;
0420 ; Get arguments
0430 ;
0440 MOVE PLA  Ignore argument count
0450  PLA  Input address hi
0460  STA INADD+1
0470  PLA  Input address lo
0480  STA INADD
0490  PLA  Output address hi
0500  STA OUTADD+1
0510  PLA  Output address lo
0520  STA OUTADD
0530  PLA  Count hi
0540  STA COUNT+1
0550  PLA  Count lo
0560  STA COUNT
0570  .PAGE
0580 ;
0590 ; Move 256 byte chunks
0600 ;
0610  LDX COUNT+1 Get count hi
0620  BEQ HIDONE If 0, hi done
0630  LDY #0 Set to move 256
0640 MORE LDA (INADD),Y Get byte
0650  STA (OUTADD),Y And store it
0660  DEY  Decrement count
0670  BNE MORE If not 0, more
0680  INC INADD+1 Next input chunk
0690  INC OUTADD+1 Next output chunk
0700  DEX  Decrement count hi
0710  BNE MORE If not 0, more
0720 ;
0730 ; Move remainder
0740 ;
0750 HIDONE LDY COUNT Count remainder
0760 CHKLO DEY  Decrement count
0770  CPY #255 Check against end
0780  BEQ LODONE If equal, done
0790  LDA (INADD),Y Get byte
0800  STA (OUTADD),Y Put byte
0810  CLC  Do a relative...
0820  BCC CHKLO JMP
0830 LODONE RTS  Fini, return
0840  .END
```

```
0100  .TITLE 'SPRAY for BASIC - 21 May 1982'
0110 ;
0120 ; BASIC callable subroutine to spray
0130 ; a value across any number of bytes.
0140 ;
0150 ; By Bob Stewart, of The Logic Smiths
0160 ; For ANTIC Magazine
0170 ;
0180 ; Calling sequence:
0190 ;
0200 ;   XX=USR(SPRAY, VALUE,OUTADD,COUNT)
0210 ;
0220 ;     XX     - Any useless variable
0230 ;     SPRAY  - Address of SPRAY code
0240 ;     VALUE  - Value to spray
0250 ;     OUTADD - Output address
0260 ;     COUNT  - Number of bytes to spray
0270 ;
0280 ; Notes:
0290 ;
0300 ;  Uses page 0 for temporary
0310 ;  storage at 204-208.
0320 ;
0330  *=$600 Actually relocatable
0340 ;
0350 ; Page 0 Temporary Storage
0360 ;
0370 VALUE=204 Input address
0380 OUTADD=205 Output address
0390 COUNT=207 Byte count
0400 ;
0410 ; Get arguments
0420 ;
0430 SPRAY PLA  Ignore argument count
0440  PLA  Ignore value hi
0450  PLA  Value lo
0460  STA VALUE
0470  PLA  Output address hi
0480  STA OUTADD+1
0490  PLA  Output address lo
0500  STA OUTADD
0510  PLA  Count hi
0520  STA COUNT+1
0530  PLA  Count lo
0540  STA COUNT
0550  .PAGE
0560 ;
0570 ; Move 256 byte chunks
0580 ;
0590  LDA VALUE Get value to spray
0600  LDX COUNT+1 Get count hi
0610  BEQ HIDONE If 0, hi done
```

continued on page 86

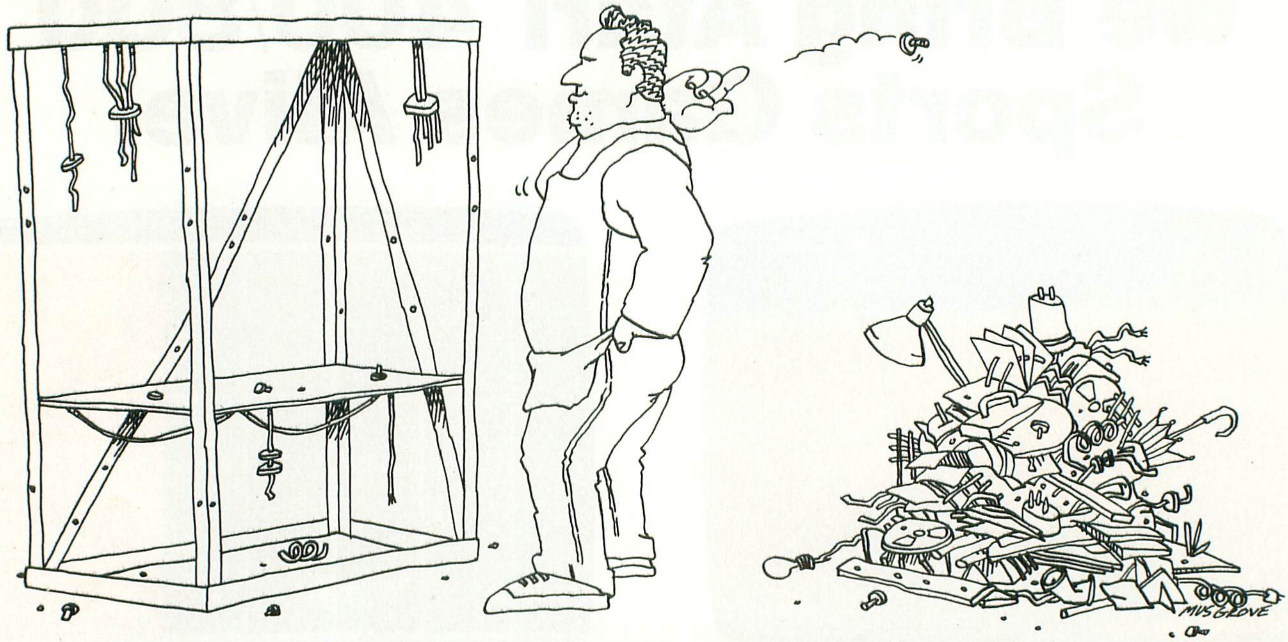
```
0620  LDY #0 Set to spray 256
0630 MORE STA (OUTADD),Y
     Store value
0640  DEY  Decrement count
0650  BNE MORE If not 0,
     more
0660  INC OUTADD+1 Next
      output chunk
0670  DEX  Decrement count hi
0680  BNE MORE If not 0,
      more
0690 ;
0700 ; Move remainder
0710 ;
0720 HIDONE LDY COUNT
     Count remainder
0730 CHKLO DEY  Decrement
     count
0740  CPY #255 Check against
     end
0750  BEQ LODONE If equal,
     done
0760  STA (OUTADD),Y Put
     byte
0770  BNE CHKLO Always
     branches!
0780 LODONE RTS  Fini, return
0790  .END
```

```
 100 REM *
 101 REM * Program to translate
 102 REM * ATARI
      Assembler Editor
 103 REM * object file into
      strings
 104 REM * for use in BASIC.
 105 REM *
 106 REM *       21 May 1982
 107 REM *
 108 REM *      by Bob Stewart
 109 REM *    of
      The Logic Smiths
 110 REM *    for
      ANTIC Magazine
 111 REM *
1000 REM *
1001 REM * Initialize
1002 REM *
1010 DIM FILE$(15),TEMP$
     (15),BLOCK$(80)
1020 DIM Q$(1):Q$=CHR$(34)
1030 BEGIN=-1
1040 GRAPHICS 0
1100 REM *
1101 REM * Get file name
1102 REM *
1110 CLOSE #1
1120 PRINT "Object file";
1130 INPUT FILE$
1140 IF LEN(FILE$)<>0
     THEN 1200
1150 FILE$="D:T.OBJ"
1160 GOTO 1400
1200 REM *
1201 REM * Add D: if needed
1202 REM *
1210 FOR I=1 TO LEN(FILE$)
1220 IF FILE$
     (I,I)=":" THEN
     POP :GOTO 1300
1230 NEXT I
1240 TEMP$=FILE$
1250 FILE$="D:"
1260 FILE$(3)=TEMP$
1300 REM *
1301 REM * Add .OBJ if needed
1302 REM *
1310 FOR I=1 TO LEN(FILE$)
1320 IF FILE$
     (I,I)="."
     THEN POP :GOTO 1400
1330 NEXT I
1340 FILE$(LEN(FILE$)+1)=".
     OBJ"
1400 REM *
1401 REM * Open file
1402 REM *
1410 TRAP 1440
1420 OPEN #1,4,0,FILE$
1430 GOTO 1500
1440 PRINT "File open error
     #";PEEK(195)
1450 GOTO 1100
1500 REM *
1501 REM * Check file header
1502 REM *  and initialize screen
1503 REM *
1510 TRAP 2100:GET #1,LO:
     GET #1,HI
1520 IF LO<>255 OR HI<>
     255 THEN PRINT
     "Not an object file":
     GOTO 1100
1530 PRINT "↖"
1540 POKE 766,1
1600 REM *
1601 REM * Figure length
     of segment
1602 REM *
1610 TRAP 2000:GET #1,LO
1620 TRAP 2100:GET #1,HI
1630 FIRST=LO+256*HI
1640 GET #1,LO:GET #1,HI
1650 LAST=LO+256*HI
1660 COUNT=1+LAST-FIRST
1670 IF BEGIN<0 THEN
     BEGIN=FIRST
1680 IF FIRST<BEGIN THEN
     PRINT "Code segment
     out of order":
     GOTO 2200
1700 REM *
1701 REM * Print Code Lines
1702 REM *
1710 INDEX=1+FIRST-BEGIN
1720 FOR LINE=1 TO COUNT
     STEP 80
1730 PRINT "9999 CODE$(";
     INDEX;")=";Q$;
1740 MAX=1+COUNT-LINE
1750 IF MAX>80 THEN MAX=80
1760 WEIRD=0
1770 FOR I=1 TO MAX
1780 GET #1,LO
1790 IF LO=34 OR LO=155
     THEN 1830
1800 PRINT CHR$(LO);
1810 BLOCK$(I,I)=" "
1820 GOTO 1860
1830 PRINT ".";
1840 BLOCK$(I,I)=CHR$(LO)
1850 WEIRD=WEIRD+1
1860 NEXT I
1870 PRINT Q$
1880 IF WEIRD=0 THEN 1940
1890 FOR I=1 TO MAX
1900 IF BLOCK$(I,I)=" "
     THEN 1930
1910 TEMP=INDEX+I-1
1920 PRINT "9999 CODE$(";
     TEMP;",";TEMP;")=
     CHR$(";ASC(BLOCK$
     (I,I));")"
1930 NEXT I
1940 INDEX=INDEX+MAX
1950 NEXT LINE
1960 GOTO 1600
2000 REM *
2001 REM * Normal end
     processing
2002 REM *
2010 X=PEEK(85):Y=PEEK(84)
2020 POSITION PEEK(82),0
2030 PRINT "9999 DIM CODE$
     (";INDEX-1;")"
2040 POSITION X,Y
2050 GOTO 2300
2100 REM *
2101 REM * Short file
     end processing
2102 REM *
2110 PRINT "File short"
2200 REM *
2201 REM * Any bad file
     end processing
2202 REM *
2210 PRINT "Not a valid
     object file"
2300 REM *
2301 REM * All cases
     end processing
2302 REM *
2310 POKE 766,0
2320 CLOSE #1
2330 NEW
```

TYPO TABLE

Variable checksum = 489711

Line num range	Code	Length
100 — 111	HN	250
1000 — 1120	XJ	199
1130 — 1250	KL	178
1260 — 1410	MV	186
1420 — 1540	YJ	290
1600 — 1700	IR	261
1701 — 1800	NH	242
1810 — 1920	NE	221
1930 — 2050	VG	197
2100 — 2310	WV	212
2320 — 2330	LE	20



DISASSEMBLER

by SHEILA NEECE SPENCER

This program was designed for you to learn more about Assembly Language programming without investing in an assembler editor. It is used to display the contents of memory in disassembled form, with opcodes and their mnemonics, just as an assembler editor displays it. You enter the address to be examined in decimal code, and the address will be displayed in hexadecimal code. For example, memory location 1536 (decimal) will be displayed as memory location 600 (hex).

After the screen fills with code, the display will stop. Press "S" to clear the screen and display the next full screen of data or "J" to request a new address or "P" to dump the contents of the screen to a printer. Any other key will display only the next line and the rest of the display will scroll upward.

You might find it interesting to load up a machine language program from disk or tape with the BASIC cartridge installed, then run the disassembler and examine various memory locations. (CAUTION: Many machine language programs won't load with the BASIC cartridge installed.)

If you have a disk, check the following locations:

3033–3119 (BD9–C2F hex)
3122–3193 (C32–C79 hex)
3196–3255 (C7C–C67 hex)
3352–3498 (D18–DAA hex)
3501–3741 (DAD–E9D hex)
4618–4762 (120A–129A hex)

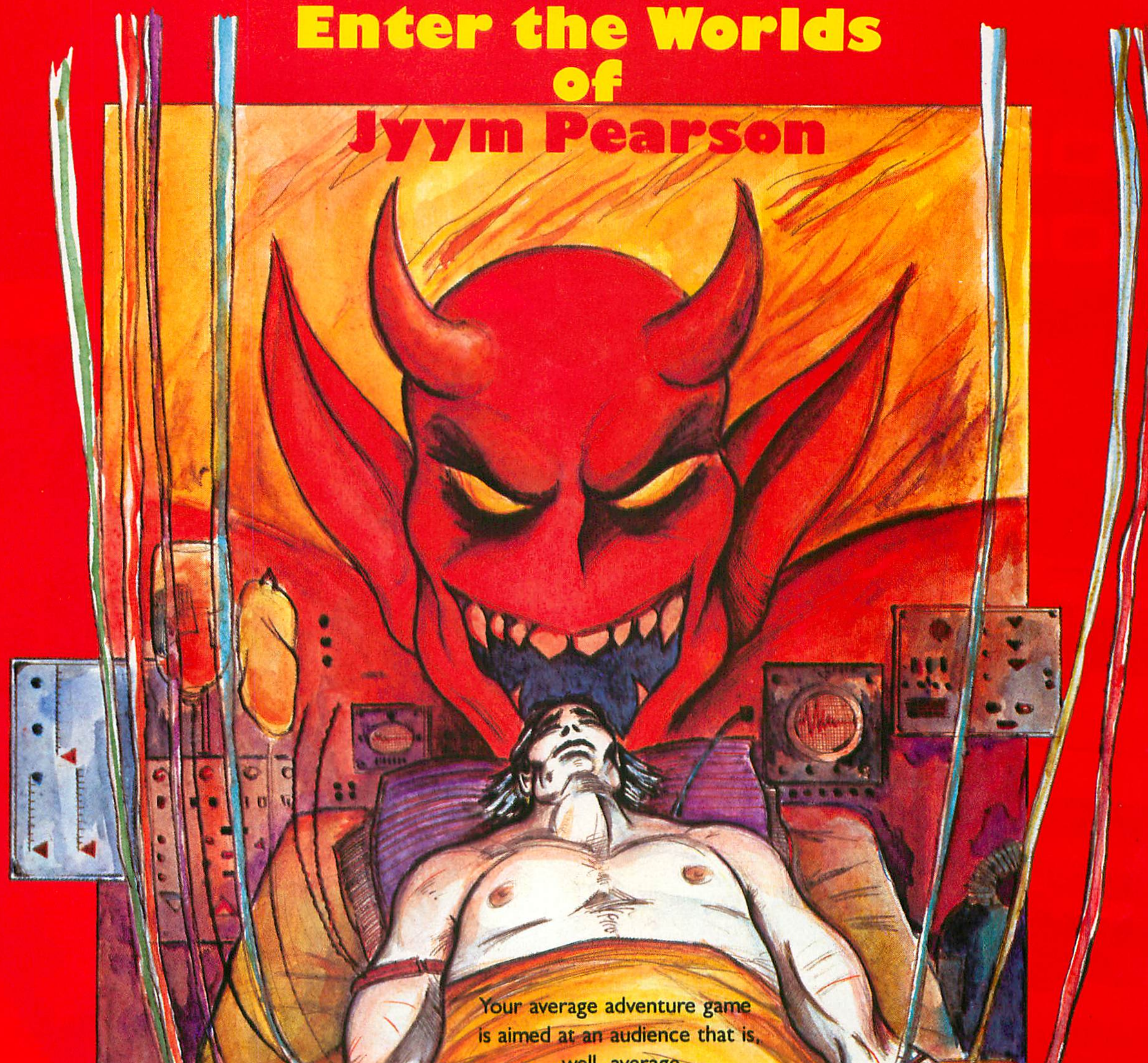
These are the RENAME, DELETE, LOCK & UNLOCK, FORMAT DISK, DISK DIRECTORY, and WRITE DOS functions, respectively.

There are several programs which poke Assembly Language subroutines into the memory from BASIC. (See ANTIC #4, p. 44 or #5, p. 57.) After running such a program, run this disassembler to see exactly what the Assembly Language routine looks like.

NOTE: This program takes advantage of ATARI BASIC's unique ability to GOTO an arithmetic expression — see lines 71 and 1010. Without this powerful feature, each opcode would have to be an IF statement, costing both memory and execution time. In line #10, the string variable PS$ should contain 39 spaces.

```
0 REM ATARI (6502)
  DISASSEMBLER
1 REM Written by
2 REM Sheila Neece Spencer
3 REM 4225 Beulah Cove
4 REM Claremore, OK 74017
  - 9/11/82
5 DIM A$(9),B$(9),C$(9),
  OP$(5),OPH$(9),D$(4),
  E$(3):HEX=40:PR1=25:
  PR2=30:PR3=35:
  OPEN #2,4,0,"K:"
10 DIM PS$(39):OPEN #3,
  4,0,"S:":PS$=
  "
                           ":
  POKE 752,1
15 INDX=100:ZP2=200:IMM=
  300:REL=400:INDY=500:ZPX=
  600:LET ABS=700:ABSY=
  800:ABSX=900:START=1000
```

continued on page 91



The Institute • Lucifer's Realm • The Paradise Threat

Available for Atari 400/800 and TRS-80 Model I/III. Please specify 16K cassette or 32K diskette, $24.95 each.

Please add $2.00 for first class shipping, $4.00 for overseas orders.

AVAILABLE FROM YOUR DEALER, OR CALL 1-800-334-5470

SCREENPLAY™ • PO Box 3558 • Chapel Hill, NC 27514

DISASSEMBLER *continued from page 88*

```
20 GOTO 950
25 ? OPH$,OP$:ML=ML
   +1:RETURN
30 ? OPH$;B$,OP$;D$;
   B$;E$:RETURN
35 ? OPH$;B$;C$,OP$;D$;
   C$;B$;E$:RETURN
40 IF A<=15 THEN GOSUB 70:
   RETURN
41 I=9
42 TEMP=A:A=INT(A/16):
   TEMP=TEMP-A*16:IF
   TEMP<10 THEN A$(I,I)=
   STR$(TEMP):GOTO 46
44 A$(I,I)=CHR$(TEMP-10
   +ASC("A"))
46 IF A<>0 THEN I=I-1:GOTO 42
48 A$=A$(I,9):RETURN
50 FOR Y=0 TO 23:POSITION
   1,Y:FOR X=1 TO 39:GET
   #3,PS
52 FOR Y=0 TO 23:POSITION
   1,Y:FOR X=1 TO
   39:GET
   #3,PS
54 PS$(X,X)=
   CHR$(PS)
56 NEXT X:LPRINT PS$:NEXT
   Y:RETURN
     70 IF A=0 THEN A$="00":
        RETURN
71 GOTO A+80
80 IF A=0 THEN A$="00":
   RETURN
81 A$="01":RETURN
82 A$="02":RETURN
83 A$="03":RETURN
84 A$="04":RETURN
85 A$="05":RETURN
86 A$="06":RETURN
87 A$="07":RETURN
88 A$="08":RETURN
89 A$="09":RETURN
90 A$="0A":RETURN
91 A$="0B":RETURN
92 A$="0C":RETURN
93 A$="0D":RETURN
94 A$="0E":RETURN
95 A$="0F":RETURN
100 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:D$="($00":
   E$=",X)":ML=ML+2:
   GOSUB PR2:RETURN
200 A=PEEK(ML+1):GOSUB
   HEX:B$=
   A$:D$="$00":E$="":
   ML=ML+2:GOSUB
   PR2:RETURN
300 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:D$="#$":
   E$="":ML=ML+2:
   GOSUB PR2:RETURN
400 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:D$="#$":
   E$="":ML=ML+2:GOSUB
   PR2:RETURN
500 A=PEEK(ML+1):GOSUB
   HEX:B$=
```

RAM REQUIREMENTS
DISASSEMBLER 8K

```
   A$:D$="($00":E$="),Y":
   ML=ML+2:GOSUB
   PR2:RETURN
600 A=PEEK(ML+1):GOSUB
   HEX:B$=
   A$:D$="$00":E$=",X":
   ML=ML+2:GOSUB
   PR2:RETURN
700 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:A=PEEK(
   ML+2):GOSUB
   HEX:C$=
   A$:D$="$":E$="":
   ML=ML+3:GOSUB
   PR3:RETURN
800 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:A=PEEK(ML
   +2):GOSUB
   HEX:C$=
   A$:D$="$":E$=",
   Y":ML=ML+3:GOSUB
   PR3:RETURN
900 A=PEEK(ML+1):GOSUB
   HEX:B$=A$:A=PEEK(ML
   +2):GOSUB
   HEX:C$=
   A$:D$="$":E$=",
   X":ML=ML+3:GOSUB
   PR3:RETURN
950 ? "⇱ENTER
   STARTING ADDRESS";:
   INPUT ML
999 REM "J" FOR
   NEW STARTING
   ADDRESS, "S" FOR
   NEXT SCREEN
   FULL, "L"
   FOR NEXT LINE
   ONLY, "P"
   TO DUMP TO
   PRINTER
1000 A=ML:IF PEEK(84)
   >=23 THEN
   GET #2,R:IF
   R=74 THEN 950
1001 IF R=76 THEN 1005
1002 IF R=83 THEN ? "⇱":
   R=0:GOTO 1005
1003 IF R=80 THEN GOSUB
   50:R=0:GOTO START
1005 GOSUB 40:? A$,
1010 OP=PEEK(ML):A=OP:
   GOSUB HEX:OPH$=A$:
   TRAP 1400:
   GOTO OP+1100
1100 OP$="BRK":GOSUB PR1:
   GOTO START
1101 OP$="ORA ":GOSUB INDX:
   GOTO START
1105 OP$="ORA ":GOSUB
   ZP2:GOTO START
1106 OP$="ASL ":GOSUB ZP2:
   GOTO START
1108 OP$="PHP":GOSUB PR1:
   GOTO START
1109 OP$="ORA ":GOSUB IMM:
   GOTO START
1110 OP$="ASL A":GOSUB
   PR1:GOTO START
1113 OP$="ORA ":GOSUB
   ABS:GOTO START
```

continued on next page

```
1114 OP$="ASL ":GOSUB
     ABS:GOTO START
1116 OP$="BPL ":GOSUB
     REL:GOTO START
1117 OP$="ORA ":GOSUB
     INDY:GOTO START
1121 OP$="ORA ":GOSUB
     ZPX:GOTO START
1122 OP$="ASL ":GOSUB
     ZPX:GOTO START
1124 OP$="CLC":GOSUB
     PR1:GOTO START
1125 OP$="ORA ":GOSUB
     ABSY:GOTO START
1129 OP$="ORA ":GOSUB
     ABSX:GOTO START
1130 OP$="ASL ":GOSUB
     ABSX:GOTO START
1132 OP$="JSR ":GOSUB
     ABS:GOTO START
1133 OP$="AND ":GOSUB
     INDX:GOTO START
1136 OP$="BIT ":GOSUB
     ZP2:GOTO START
1137 OP$="AND ":GOSUB
     ZP2:GOTO START
1138 OP$="ROL ":GOSUB
     ZP2:GOTO START
1140 OP$="PLP":GOSUB
     PR1:GOTO START
1141 OP$="AND ":GOSUB
     IMM:GOTO START
1142 OP$="ROL A":GOSUB
     PR1:GOTO START
1144 OP$="BIT ":GOSUB
     ABS:GOTO START
1145 OP$="AND ":GOSUB
     ABS:GOTO START
1146 OP$="ROL ":GOSUB
     ABS:GOTO START
1148 OP$="BMI ":GOSUB
     REL:GOTO START
1149 OP$="AND ":GOSUB
     INDY:GOTO START
1153 OP$="AND ":GOSUB
     ZPX:GOTO START
1154 OP$="ROL ":GOSUB
     ZPX:GOTO START
1156 OP$="SEC":GOSUB
     PR1:GOTO START
1157 OP$="AND ":GOSUB
     ABSY:GOTO START
1161 OP$="AND ":GOSUB
     ABSX:GOTO START
1162 OP$="ROL ":GOSUB
     ABSX:GOTO START
1164 OP$="RTI":GOSUB
     PR1:GOTO START
1165 OP$="EOR ":GOSUB
     INDX:GOTO START
1169 OP$="EOR ":GOSUB
     ZP2:GOTO START
1170 OP$="LSR ":GOSUB
     ZP2:GOTO START
1172 OP$="PHA":GOSUB
     PR1:GOTO START
1173 OP$="EOR ":GOSUB
     IMM:GOTO START
1174 OP$="LSR A":GOSUB
     PR1:GOTO START
1176 OP$="JMP ":GOSUB
     ABS:GOTO START
1177 OP$="EOR ":GOSUB
     ABS:GOTO START
1178 OP$="LSR ":GOSUB
     ABS:GOTO START
1180 OP$="BVC ":GOSUB
     REL:GOTO START
1181 OP$="EOR ":GOSUB
     INDY:GOTO START
1185 OP$="EOR ":GOSUB
     ZPX:GOTO START
1186 OP$="LSR ":GOSUB
     ZPX:GOTO START
1188 OP$="CLI":GOSUB
     PR1:GOTO START
1189 OP$="EOR ":GOSUB
     ABSY:GOTO START
1193 OP$="EOR ":GOSUB
     ABSX:GOTO START
1194 OP$="LSR ":GOSUB
     ABSX:GOTO START
1196 OP$="RTS":GOSUB
     PR1:GOTO START
1197 OP$="ADC ":GOSUB
     INDX:GOTO START
1201 OP$="ADC ":GOSUB
     ZP2:GOTO START
1202 OP$="ROR ":GOSUB
     ZP2:GOTO START
1204 OP$="PLA":GOSUB
     PR1:GOTO START
1205 OP$="ADC ":GOSUB
     IMM:GOTO START
1206 OP$="ROR A":GOSUB
     PR1:GOTO START
1208 OP$="JMP ":GOSUB
     ABS:GOTO START
1209 OP$="ADC ":GOSUB
     ABS:GOTO START
1210 OP$="ROR ":GOSUB
     ABS:GOTO START
1212 OP$="BVS ":GOSUB
     REL:GOTO START
1213 OP$="ADC ":GOSUB
     INDY:GOTO START
1217 OP$="ADC ":GOSUB
     ZPX:GOTO START
1218 OP$="ROR ":GOSUB
     ZPX:GOTO START
1220 OP$="SEI":GOSUB
     PR1:GOTO START
1221 OP$="ADC ":GOSUB
     ABSY:GOTO START
1225 OP$="ADC ":GOSUB
     ABSX:GOTO START
1226 OP$="ROR ":GOSUB
     ABSX:GOTO START
1229 OP$="STA ":GOSUB
     INDX:GOTO START
1232 OP$="STY ":GOSUB
     ZP2:GOTO START
1233 OP$="STA ":GOSUB
     ZP2:GOTO START
1234 OP$="STX ":GOSUB
     ZP2:GOTO START
1236 OP$="DEY":GOSUB
     PR1:GOTO START
1238 OP$="TXA":GOSUB
     PR1:GOTO START
1240 OP$="STY ":GOSUB
     ABS:GOTO START
1241 OP$="STA ":GOSUB
     ABS:GOTO START
1242 OP$="STX ":GOSUB
     ABS:GOTO START
1244 OP$="BCC ":GOSUB
     REL:GOTO START
```

```
1245 OP$="STA ":GOSUB
     INDY:GOTO START
1248 OP$="STY ":GOSUB
     ZPX:GOTO START
1249 OP$="STA ":GOSUB
     ZPX:GOTO START
1250 OP$="STX ":GOSUB
     ZPX:GOTO START
1252 OP$="TYA":GOSUB
     PR1:GOTO START
1253 OP$="STA ":GOSUB
     ABSY:GOTO START
1254 OP$="TXS":GOSUB
     PR1:GOTO START
1257 OP$="STA ":GOSUB
     ABSX:GOTO START
1260 OP$="LDY ":GOSUB
     IMM:GOTO START
1261 OP$="LDA ":GOSUB
     INDX:GOTO START
1262 OP$="LDX ":GOSUB
     IMM:GOTO START
1264 OP$="LDY ":GOSUB
     ZP2:GOTO START
1265 OP$="LDA ":GOSUB
     ZP2:GOTO START
1266 OP$="LDX ":GOSUB
     ZP2:GOTO START
1268 OP$="TAY":GOSUB
     PR1:GOTO START
1269 OP$="LDA ":GOSUB
     IMM:GOTO START
1270 OP$="TAX":GOSUB
     PR1:GOTO START
1272 OP$="LDY ":GOSUB
     ABS:GOTO START
1273 OP$="LDA ":GOSUB
     ABS:GOTO START
1274 OP$="LDX ":GOSUB
     ABS:GOTO START
1276 OP$="BCS ":GOSUB
     REL:GOTO START
1277 OP$="LDA ":GOSUB
     INDY:GOTO START
1280 OP$="LDY ":GOSUB
     ZPX:GOTO START
1281 OP$="LDA ":GOSUB
     ZPX:GOTO START
1282 OP$="LDX ":GOSUB
     ZPX:GOTO START
1284 OP$="CLV":GOSUB
     PR1:GOTO START
1285 OP$="LDA ":GOSUB
     ABSY:GOTO START
1286 OP$="TSX":GOSUB
     PR1:GOTO START
1288 OP$="LDY ":GOSUB
     ABSX:GOTO START
1289 OP$="LDA ":GOSUB
     ABSX:GOTO START
1290 OP$="LDX ":GOSUB
     ABSY:GOTO START
1292 OP$="CPY ":GOSUB
     IMM:GOTO START
1293 OP$="CMP ":GOSUB
     INDX:GOTO START
1296 OP$="CPY ":GOSUB
     ZP2:GOTO START
1297 OP$="CMP ":GOSUB
     ZP2:GOTO START
1298 OP$="DEC ":GOSUB
     ZP2:GOTO START
1300 OP$="INY":GOSUB
     PR1:GOTO START
1301 OP$="CMP ":GOSUB
     IMM:GOTO START
1302 OP$="DEX":GOSUB
     PR1:GOTO START
1304 OP$="CPY ":GOSUB
     ABS:GOTO START
1305 OP$="CMP ":GOSUB
     ABS:GOTO START
1306 OP$="DEC ":GOSUB
     ABS:GOTO START
1308 OP$="BNE ":GOSUB
     REL:GOTO START
1309 OP$="CMP ":GOSUB
     INDY:GOTO START
1313 OP$="CMP ":GOSUB
     ZPX:GOTO START
1314 OP$="DEC ":GOSUB
     ZPX:GOTO START
1316 OP$="CLD":GOSUB
     PR1:GOTO START
1317 OP$="CMP ":GOSUB
     ABSY:GOTO START
1321 OP$="CMP ":GOSUB
     ABSX:GOTO START
1322 OP$="DEC ":GOSUB
     ABSX:GOTO START
1324 OP$="CPX ":GOSUB
     IMM:GOTO START
1325 OP$="SBC ":GOSUB
     INDX:GOTO START
1328 OP$="CPX ":GOSUB
     ZP2:GOTO START
1329 OP$="SBC ":GOSUB
     ZP2:GOTO START
1330 OP$="INC ":GOSUB
     ZP2:GOTO START
1332 OP$="INX":GOSUB
     PR1:GOTO START
1333 OP$="SBC ":GOSUB
     IMM:GOTO START
1334 OP$="NOP":GOSUB
     PR1:GOTO START
1336 OP$="CPX ":GOSUB
     ABS:GOTO START
1337 OP$="SBC ":GOSUB
     ABS:GOTO START
1338 OP$="INC ":GOSUB
     ABS:GOTO START
1340 OP$="BEQ ":GOSUB
     REL:GOTO START
1341 OP$="SBC ":GOSUB
     INDY:GOTO START
1345 OP$="SBC ":GOSUB
     ZPX:GOTO START
1346 OP$="INC ":GOSUB
     ZPX:GOTO START
1348 OP$="SED":GOSUB
     PR1:GOTO START
1349 OP$="SBC ":GOSUB
     ABSY:GOTO START
1353 OP$="SBC ":GOSUB
     ABSX:GOTO START
1354 OP$="INC ":GOSUB
     ABSX:GOTO START
1400 ? "INVALID OPCODE":
     TRAP 40000:ML=ML+1:
     GOTO START
1600 ? "CHECK PRINTER":
     POP :GOTO START
```

TYPO TABLE

Variable checksum = 766429

Line num range	Code	Length
1 – 20	IC	511
25 – 54	AL	438
56 – 88	VV	207
89 – 500	NF	451
600 – 1000	UV	560
1001 – 1110	AP	328
1113 – 1133	UV	263
1136 – 1153	FB	264
1154 – 1174	OT	262
1176 – 1196	ZZ	262
1197 – 1217	GP	264
1218 – 1240	SP	261
1241 – 1260	FW	262
1261 – 1276	HJ	262
1277 – 1293	ND	262
1296 – 1313	JQ	262
1314 – 1333	RY	262
1334 – 1354	BR	262
1400 – 1600	LD	78

NEW WORDS

by JOHN PETERS

The following Forth words were compiled by John Peters, an active Forth user in San Francisco. When screen 50 is loaded, a 25th line will appear at the top of your television screen showing the stack contents. As with all Forth words, they can be adapted, enhanced, or altered in any way suitable to end-users. If these words suggest other ideas, let us know. We encourage the entire Forth community to share their discoveries and ideas in Forth Factory.

```
\ 50 25th line  a.k.a. DISPLAY STACK
   DECIMAL

: DO-THRU  ( from thru ---)
       compile 1+ compile swap
       compile (do) here 3 ; immediate

: PRE    ( pre get-screen to buffers )
       8 * DUP 9 + SWAP
       DO I BLOCK DROP LOOP ;
: PRES  DO-THRU I PRE LOOP ;
  71 75 PRES
51 LOAD
52 LOAD
53 LOAD
54 LOAD
55 LOAD

: DON   info-line install ;
: DOFF  info-line remove ;
: 25th_LINE__/ ; ( Dictionary marker )

  DON ;S
```

```
\ 51 25th LINE NORMAL WINDOW COLCRS   A

VOCABULARY INFO-LINE  IMMEDIATE

INFO-LINE   DEFINITIONS   HEX

VIDEO-BASE CONSTANT NORMAL
  ( beginning of screen RAM for )
  ( OS graphics mode 0 )

: WINDOW    ( addr --- )
  ( Makes OS think screen RAM is at )
  ( addr. )
  58 !    0 0 POSITION ;

55 CONSTANT COLCRS
  ( OS address of cursor column # )

FORTH DEFINITIONS  DECIMAL
```

```
\ 52 25th line  CLEAR25 DLIST            B

INFO-LINE DEFINITIONS  HEX

HERE  DUP 3F + FFC0 AND  SWAP - ALLOT

LABEL BUFF25   DECIMAL 40 ALLOT
  ( Screen RAM for info line )

: CLEAR25
  BUFF25 40 ERASE ;

LABEL DLIST   HEX
  ( Part of a display list which gets )
  ( patched into the OS one to create )
  ( the info line. )
  70 C, 70 C,       ( some blank lines )
  42 C, BUFF25 ,    ( mode 0 w/LMS     )
  01 C, 0 ,         ( ANTIC JMP back   )
                    (  to the OS       )
                    (  display list    )

FORTH DEFINITIONS  DECIMAL
```

continued on page 98



That's right — anything can happen, and it usually does! Because with a Scott Adams Graphic Adventure, the fantastic is as close as your computer — and your own fertile imagination. Each S.A.G.A. features the finest in hi-resolution graphics — graphics which compliment and enhance the classic text — and, they can be toggled on or off with a single keystroke, too. Plus, optional Votrax Type 'N Talk™ and printer compatibility give you the flexibility to add new dimensions to your Adventuring — when you're ready.

The incomparable S.A.G.A. Series — experience the magic yourself. But be prepared for anything.

S.A.G.A. #1 — Adventureland (Skill Level: Moderate)

APPLE 2 PLUS 48K Disk (DOS 3.3 req.)	042-0201	$39.95
ATARI 48K Disk	052-0201	$39.95

S.A.G.A. #2 — Pirate Adventure (Skill Level: Beginner)

APPLE 2 PLUS 48K Disk (DOS 3.3 req.)	042-0202	$39.95
ATARI 48K Disk	052-0202	$39.95

S.A.G.A. #3 — Mission Impossible (Skill Level: Advanced)

APPLE 2 PLUS 48K Disk (DOS 3.3 req.)	042-0203	$39.95
ATARI 48K Disk	052-0203	$39.95

S.A.G.A. #6 — Strange Odyssey (Skill Level: Moderate)

APPLE 2 PLUS 48K Disk (DOS 3.3 req.)	042-0206	$39.95
ATARI 48K Disk	052-0206	$39.95

PRICES SUBJECT TO CHANGE

Also, look for the Scott Adams Text Adventure Series on these fine computers:
TRS-80 • COMMODORE VIC • NEC PC-8001
TEXAS INSTRUMENTS 99/4 • CP/M Z-80

Adventure INTERNATIONAL

To order, see your local dealer. If he does not have the program, then call 1-800-327-7172 (orders only please) or write for our free catalog.
Published by ADVENTURE INTERNATIONAL
a subsidiary of Scott Adams, Inc.
BOX 3435 • LONGWOOD, FL 32750 • (305) 830-8194

NEW WORDS *continued from page 94*

```
\ 53 25th    DEC# HEX# BIN# U# BASE#  C

INFO-LINE DEFINITIONS  DECIMAL

: DEC#   ( n1 --- addr n )
  DUP ABS 0  <#  #S  SIGN  #> ;

: HEX#   ( u --- addr n )
  0  <#  # # # #  #> ;

: BIN#   ( u --- addr n )
  0  <#  16 0 DO # LOOP  #> ;

: U#   ( u --- addr n )
  0  <#  #S  #> ;

: BASE#   ( n1 --- addr n )
        BASE @ CASE
  10 OF DEC# ENDOF
  16 OF HEX# ENDOF
   2 OF BIN# ENDOF
  >R U# R>  ENDCASE ;
```

```
\ 54 25th Line  BAC< .STACK DISPLAY   D

INFO-LINE DEFINITIONS  DECIMAL

: BAC<   ( n --- )
  MINUS COLCRS +! ;

: .STACK   ( --- )
                         DEPTH 2 > IF
                       DEPTH 1+  3  DO
                       I (PICK) BASE#
                   DUP COLCRS @  < IF
          >R R BAC< R TYPE R> 1+ BAC< ELSE
                  DROP DROP LEAVE THEN
                                 LOOP
                                 THEN ;

: DISPLAY   ( --- )
    LOCATION   CURSOR-OFF
    CLEAR25 BUFF25 WINDOW
  34 0 POSITION ." <-TOS"
    33 0 POSITION .STACK
          NORMAL WINDOW
      POSITION CURSOR-ON ;
```

```
\ 55 25th Line PATCH- ROUTINE INSTALL E

INFO-LINE DEFINITIONS  HEX

: PATCH-   ( --- )
       0230 @   DUP C@ 01 = NOT IF
  DUP 3 + DLIST 6 + !  01 OVER C!
            DLIST SWAP 1+ ! ELSE
                       DROP THEN ;
: ROUTINE   ( --- )
  PATCH- DISPLAY CR ;

: INSTALL
  ' ROUTINE CFA  ' ABORT 6 + !
  ' ROUTINE CFA  ' QUIT 0A + !
            [COMPILE] FORTH ;
: REMOVE
        ' CR CFA  ' ABORT 6 + !
        ' CR CFA  ' QUIT 0A + !
   0 022F C!  0230 @  3  70  FILL
  22 022F C!      [COMPILE] FORTH ;

FORTH DEFINITIONS  DECIMAL
```

SCHEMATIC

Tighten the frequency window

by CARL EVANS

We have discussed many aspects of the 410 Program Recorder, travelling a long road from the properties of magnetic tape to the functional block-diagram in the last issue. Now we unveil the long-promised schematic diagram for the digital playback circuit in the 410 Recorder and show you how to upgrade the circuit to obtain more reliable CLOADs. I will also answer a number of reader questions in our new Tangle Angles section.

Figure 1 shows the schematic diagram of my 410 Recorder. I strongly suspect that there are many different 'models' of this recorder carrying the 410 trademark. Therefore, I can not guarantee that this schematic will match your particular recorder, but the four units I have been able to examine do match this diagram. The schematic is arranged in the same format that I used for the functional block-diagram in the last issue.

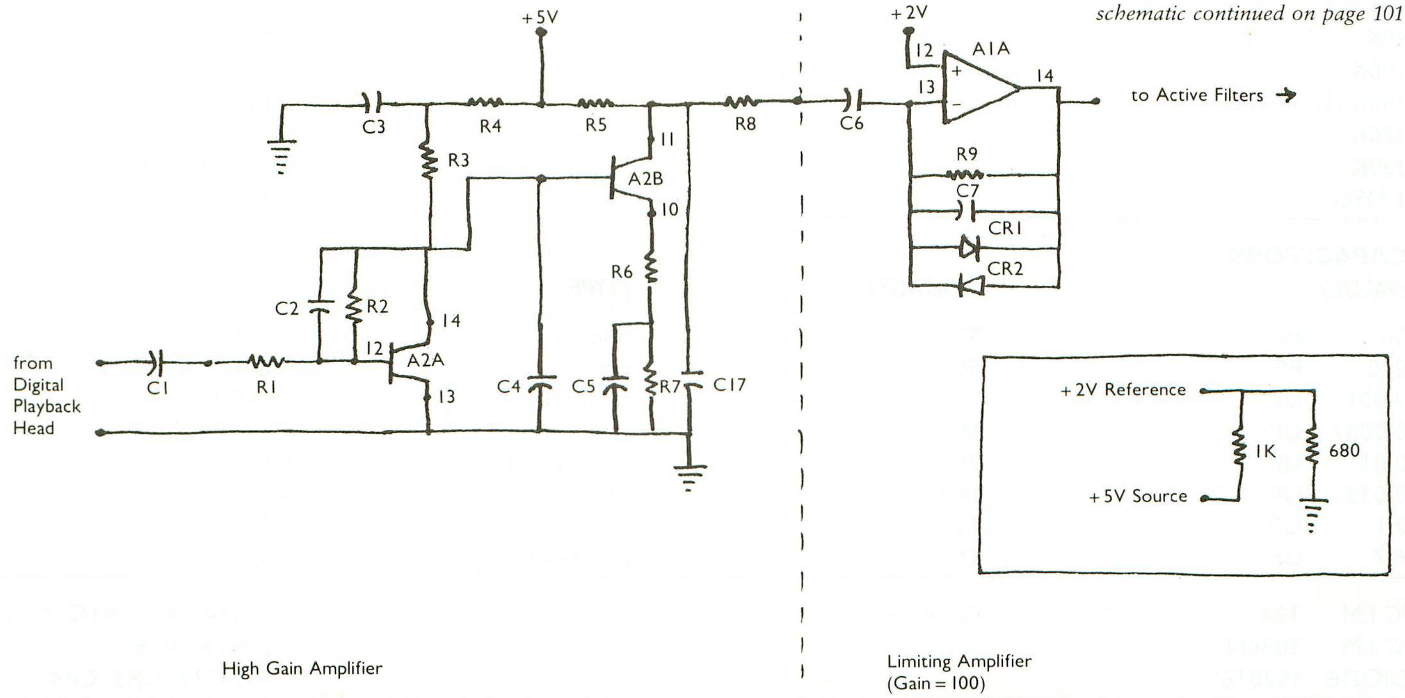
I mentioned a while back that there is a 'reliability fix' that you can make on your 410 Recorder. The 'fix' is really quite simple once you have a schematic to follow. All you have to do is replace a few ten-per-cent resistors with their one-per-cent brothers. You can get the needed resistors at most electronic supply stores. I got mine at Radio Shack.

The resistors to replace are the ones in the feedback loops of the two active

Figure 1

ATARI 410 PROGRAM RECORDER
DIGITAL PLAYBACK CIRCUIT
SCHEMATIC DIAGRAM

schematic continued on page 101



filters. Specifically, I am referring to the 240K-ohm, ½-watt resistor and the 330K-ohm, ¼-watt resistor. Replacing these two resistors will 'tighten' the window of frequencies that will be interpreted as data. In addition, I recommend that you replace the ten-per-cent tolerance 56K, 5.6K, 68K, and 7.5K, ¼ watt resistors which you will also find in that part of the circuit. I must caution you that any tampering of this type will void the warranty on the recorder, so you should wait until the warranty expires before making these modifications.

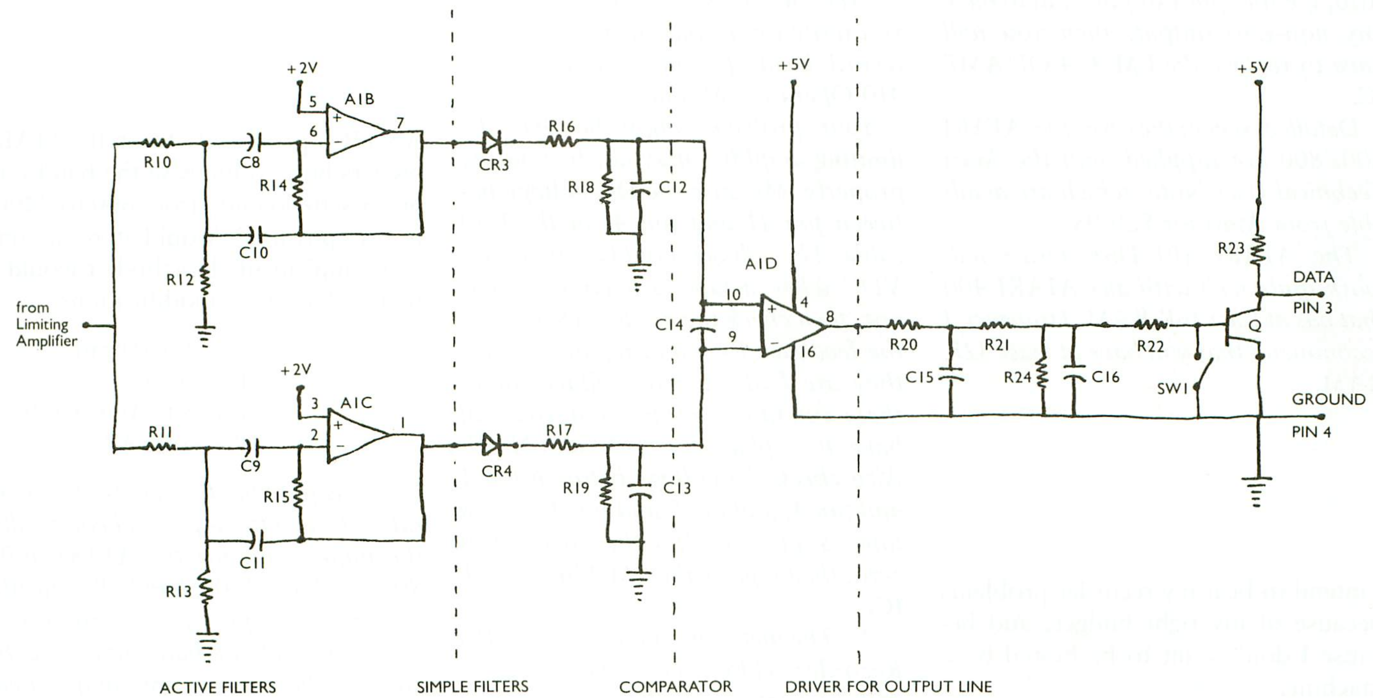
Don't worry about replacing the wrong resistors. None of the circuits in the recorder will be degraded by such a mistake. If you are in doubt about which particular 330K-ohm resistor to replace (there are three in the machine), then just replace all of them.

I have not yet seen one of the new ATARI 1010 Program Recorders. I plan to report later this year on the new recorder. It should be interesting to see if Atari has improved the design any.

The rest of the department this time is devoted to answering some of the letters you have sent in. Keep those letters coming. In the next issue, I will talk about the audio playback circuit and show you the schematic that I came up with for it.

ATARI 410 PROGRAM RECORDER DIGITAL PLAYBACK CIRCUIT ELECTRONIC PARTS LIST

DESCRIPTION				LOCATOR
RESISTORS (¼ Watt unless otherwise noted)				
47				R6
470				R4, R7
1K				R1, R5, R8
4.7K				R20, R21, R22
5.6K				R13
7.5K				R12
10K				R3, R24
15K				R16, R17
56K				R11
68K				R10
100K				R23
240K (½ WATT)				R15
270K				R18
330K				R2, R14, R19
1 MEG				R9
CAPACITORS				
(VALUE)		*(VOLTAGE)*	*(TYPE*	
50	PF	50	disc	C2, C7
820	PF	50	poly	C8, C9, C10, C11
0.001	UF	25	axial ceramic	C4, C14
0.0047	UF	50	axial ceramic	C12, C13
0.01	UF	25	axial ceramic	C6, C17
0.033	UF	100	Mylar	C15, C16
0.1	UF	25	axial ceramic	C1
4.7	UF	35	radial electrolytic	C3, C5
IC LM	324	OP AMP		A1 A1A, A1B, A1C, A1D,
IC LM	3086N			A2 A2A, A2B
DIODE	1S2076			CR1, CR2, CR3, CR4



Tangle Angles

This forum for resolution of problems with cassette tapes and the Atari Program Recorder features responses to your letters. Space requires us to edit your letters to the essentials. Some letters duplicate the problems of others, so will not be printed. Therefore, if you have written, watch for your problem to be reflected in the letters and answers we do print. Some of you ask for an individual or prompt answer. If you include a self-addressed stamped envelope I will try to comply. When writing, be as specific as you can, especially if problems persist after you have tried techniques I recommend. If you discover something you think helps, send that too. We're all in this together. —Carl Evans

I have an ATARI 400 and 410 recorder, and can't load programs reliably. Prerecorded tapes work, but my own go sour. I swapped my original recorder for a new one, but it's still not working. I notice a hiss with my tapes that is not there on prerecorded. I think this is due to DC bias used to erase my tapes. Perhaps hiss is being read as FSK and giving bad data. I disconnected my erase head and now bulk erase my tapes. Of course, the real solution is to "narrow the window" on the decoders.

Do you know a way to get a schematic on the 400 computer? I want to add "video out." Also, can you use the 400 with a disk drive?

Gary Pearcy
Stone Mountain, CA

Your tape hiss problem is most likely due to a bad diode in the limiting amplifier portion of the playback circuit. Your solution, while effective, is a bit drastic. Check the two diodes in the limiting amplifier and replace the bad one. If the problem comes back, then the gain of the front-end amplifier is probably too high. If that is the case, then you will have to measure the gain and calculate the value of a new gain resistor to lower the gain. A real quick check is to measure the DC voltage between pin 11 and pin 4 (ground) of the I/O cable. With a tape being played, this voltage should be about 3.6 VDC. If the reading is zero, then replace the LM 3086N IC. Any other bad reading means that the limiting diodes (1S2076) are probably bad.

continued on next page

Also, if either pin 1 or pin 7 fail to have any non-zero output, then you will have to replace the LM 324 OP AMP IC.

Detailed schematics for the ATARI 400/800 are supplied with the Atari Technical User Notes which are available from Atari for $29.95.

The ATARI 810 Disk Drive will work quite well with any ATARI 400 that has at least 16K RAM. However, I recommend that you have at least 32K RAM.

I intend to beat my recorder problems because of my tight budget, and because I don't want to be bested by a machine.

1. I get lots of errors 138, 140 and 143., These often have line numbers (eg. ERROR 143 at LINE 19275) even when the program has no such line number. With a new tape, my recorder worked all right for the first read of test programs; but after modifying the programs slightly, and copying back on the same tape, I got an ERROR 143 on the first try, and ERROR 138 on the second try.

2. The footcounter slips when rewinding or advancing, so it is of questionable accuracy for finding programs.

3. I'd like to get multiple programs on tape, but don't like to skip ten feet of tape between programs. I'd rather put them close together so the audible end of one program signals the beginning of the next.

4. The Atari Reference Manual doesn't mention what really happens with PRINT and INPUT statements used with tape. Not a word about the need for an End of Line signal between each item. Thanks to Lon Poole for that info.

5. Any chance the Atari Recorder will be able to look for programs on a tape by name?

Dale Myers
Worthington, OH

1. Try bulk erasing each tape before you write on it, and clean your play/record heads per instructions in the 410 Operators Manual.

Your problem might be that the limiting amplifier may not be limiting properly. Measure the DC voltage between pin 11 and pin 4 on the I/O cable. The voltage should be about 3.6 VDC when a tape is playing. If it is not, then check the diodes (1S2076) in the feedback loop and replace them if they are bad. A zero voltage under these conditions means that you will have to replace the LM 3086N IC. Also check the voltage between pin 1 and pin 4, and pin 7 and pin 4 while a tape is playing. If either reading is zero, then replace the LM 324 or AMP IC.

2. The meter mechanism on the 410 Recorder seldom works very long or very accurately. The belt drive system is very sloppy and is at best unreliable. This is one of the reasons that I recommend putting only one program on each side of a cassette tape.

3. Storing more than one program on each side of a tape is recommended only for archive purposes. The retrieval problem is error-prone and tends to be too time consuming for everyday use. There are two reasons I suggest a 10-foot count on the meter between files. First, it is possible to destroy a good file by over-writing the End-of-File marker if you don't space forward at least a little bit. Second, for archive applications, I fast-forward a tape to about where I think the desired file is (remember, the foot counter doesn't work reliably) and listen for a section of blank tape to help me locate the next file.

4. The need for EOL markers between data blocks is explained in the Technical User's Notes which are available from Atari.

5. Sorry, it is not feasible to make the ATARI 400/800 look for cassette file names.

ANTIC promised to tell ATARI owners how to increase the baud rate on cassette loading from 600 to 2400. Is this possible? Would it be a software-implemented method or would it require hardware modification?

W. D. Creegan,
President
Prescott Atari Club
Prescott, AZ

Yes, it is possible to increase the baud rate of cassette tapes. Theoretically, the upper limit for the ATARI 400/800 is about 1400 baud. Practically, however, the upper limit is about 600 baud (the default baud rate used by Atari). The reasons are complicated, but a simplistic explanation is that the FSK data system that Atari uses is naturally sensitive to frequency deviations. At high baud rates these deviations are accentuated. There are two solutions to this problem. The first is to use a tape recorder with a lower WOW and Flutter rating. The second is to use chromium tapes. The first solution is the best, but impractical until someone markets an FSK-to-Digital translator. The second solution means death to your 410 Recorder.

If you have used one of the foregoing solutions, then the way to make your tapes operate at higher baud rates is to write a handler that will intercept the Operating System when it tries to set the baud rate to 600 baud. Such an interception will depend upon whether or not there is a RAM location that the OS goes to during the setting of the baud rate. I haven't had the occasion to make such a search yet, but I will look into it further and let you know what I find out in a future issue.

SEA DRAGON

Adventure International
P.O. Box 3435
Longwood, FL 32750
(305) 862-6917
$34.95
16K — Cassette
32K — Diskette

Reviewed by David Plotkin

The newest release from Adventure International for the ATARI is an excellent arcade game called **Sea Dragon**. The talented author is Russ Wetmore, who wrote Preppie! Once again he has done a good job of mixing action and playability in this underwater version of the arcade classic Scramble.

In Sea Dragon, you are in command of a submarine which must navigate past various obstacles. The submarine is armed with an unlimited supply of torpedoes, but you can only have two torpedoes on the screen at a time. The air supply is limited so you must surface periodically. Since surfacing is not always possible, you must plan ahead to have enough air. The underwater landscape is constantly scrolling from right to left. By pushing your joysticks up and down you change the depth of the craft, and to the right causes the submarine to advance slowly until it reaches mid-screen. Holding the joystick left causes the submarine to move left at exactly the same speed as the landscape is scrolling. It effectively stands still in the water until the submarine hits the left edge of the screen. Then the edge of the screen essentially pushes the craft along. You cannot back up in this game.

Sea Dragon is divided into six distinct sections, each more difficult than the last, and each requiring a different strategy. The first section is a sea bottom dotted with ominous black mines. The next scene is a cavern filled not only with mines but also indestructible gun turrets that fire a stream of bullets. Sections three and four are also seascape and a cave, respectively, but you have destroyers and lasers firing at you. The last two sections are extremely difficult to gain access to and have even more sophisticated weapons and obstacles.

Sea Dragon is quite playable, but not advised for those with a low tolerance for frustration. It is one of the more difficult arcade games I have played. Adventure International told me that they deliberately made it hard to challenge players. The game is tough because the submarine responds a little too slowly and you have no downward firing weapons. Also, you have to go back to the beginning of the current sector each time you lose a sub.

Overall, however, Sea Dragon is a very fine game. The graphics cannot be called stunning, but they are very good. The submarine is a single line resolution player, complete with torpedo tubes which change shape as the torpedo is launched. The seascape itself is a redefined character set, as are the mines. The mines move smoothly with a much finer resolution than normal character position changes. The sound is great. The explosions and echoing sonar are superb, and the lasers are eerie.

Certain strategies are only made possible by Russ Wetmore's fine attention to detail. It is obvious that extensive play testing went into Sea Dragon. It can be played by one or two players and has five skill levels. For those of you who don't mind a challenge, I recommend it. Keep up the good work, AI.

WIZARD OF WOR

Roklan Software
3335 Arlington Heights Road
Arlington Heights, IL 60004
(312) 392-2525
$39.95
32K — Disk

Reviewed by Gordon Miles

My excitement and expectations rise when I see an ad delcaring that a popular arcade game is now available for my machine. When will it be available? How much will it cost? Will it play and look exactly like the original quarter-eater? All too often the novelty dissolves soon after the cellophane is removed, and I'm disappointed. Fortunately, Roklan lives up to my expectations and has done an excellent rendition of **The Wizard of Wor.**

Wizard of Wor plays almost exactly like the original arcade version. You and a friend can control up to seven laser-armed *worriors*. Your mission is to conquer as many of the Wizard's mazes as possible. The Wizard's *worling* monsters populate these mazes. *Worlings* are initially blue Burwors, but are transformed into the faster-moving yellow Garwors, and then the super-speedy red Thorwors. Your *worriors* are killed upon collision with a *worling* or its laser shot.

The maze area itself is a square with hallways on either side and you may move from left to right within the square. A radar scanner lies beneath the maze display. The scanner is used to track Garwors and Thorwors, which may be invisible, unless they are in your *worrior's* corridor on the main maze display. For each player there is also a small entrance vestibule where all your *worriors* begin.

Each player enters from his own vestibule. If the maze in front of the entrance is not clear of *worlings*, you are given a ten-second count before you are ejected into the maze. From then on both strategy and swift reactions are needed to hunt the *worlings* while they hunt you. Best results are obtained in short corridors where your one-shot-at-a-time laser can regenerate faster. Constant appraisal of the radar scanner as well as judicious use of the connecting hallways are invaluable aids.

After all the *worlings* are destroyed, the Wizard's winged-moster, a *worluk*, appears. Shooting the swift *worluk* before it can leave the maze via the connecting hallways earns bonus points. If the *worluk* is shot, the Wizard himself may appear. He throws laser bolts while teleporting from one random maze location to the next. The next round does not start unless you get him (bonus points) or he kills your *worrior.*

In each succeeding round the Wizard and his minions move faster, and the maze has fewer walls to provide cover for your *worrior.* Every fourth round earns a new *worrior* as well as the Arena maze where half of the maze has no walls. Every twelfth wave earns the Pit maze where there are no walls at all. The Pit, which is quite difficult, is aptly named.

The play of the game is fast-paced as well as strategically demanding. Especially enjoyable is the two-player mode. Although each player could shoot the other for points, cooperation resulted in higher scores. If you saved your fellow *worrior* from a tight spot you were usually returning a favor.

The characters are a tad chunky graphically, but the animation is smooth, colorful, lively, and well

continued on page 107

You and your family will enjoy learning in your home when you

Stop Playing with Your Atari



We have over 1000 Educational Programs for use on your Atari 400/800 Computers!

All along you've heard there isn't much of a selection of low cost microcomputer courseware. Well, do you want to learn Physics, Psychology, or Philosophy? Accounting or Auto Mechanics? Sociology, Supervision or Statistics? Economics or Electronics? How about English as a Second Language? Would you like to teach your children Math or Reading? If you do, then we have the educational programs for you—and at affordable prices.

It's true there aren't many companies that offer full-length courses in subjects other than reading and arithmetic, and what is offered seems to be drills, tests, games, or simulations. What you really want is a course that covers the subject with, say, 16 full-length lessons called tutorial programs, where you interact with an expert programmer backed by a staff of experts. That's exactly what we have.

ASK THESE QUESTIONS

Why haven't you heard of us before? We're a public company that's been trading over the counter for 16 years. We've been developing interactive learning systems since 1957. We sell hardware and software for interactive film, slide, video and computer learning to the educational field, vo-techs, industries, military, and several state and federal agencies. Our programs are used in all 50 states and even in some foreign countries! In 1975, we started to convert to the Talk & Teach Computer-Assisted Instruction (CAI) System, licensed Atari to use it in 1977, and in 1981 licensed Radio Shack to use our Talk/Tutor System. So, why haven't you heard of us? Frankly, we've kept a low profile. Until now.

Is there something wrong with our software? Well, we don't ask you to enter your name so we can drop it into some later text. We don't ask you to type in your answer and refuse to accept it if it's not spelled just right. And, we don't branch around a lot when you make an error. Our programs simply let you know if you're wrong by proceeding only when you select the right multiple-choice answer.

This proven learning-by-positive-reinforcement method lets you proceed quickly and smoothly through the programs, without a lot of cute tricks. But, if you're a devoted computerist or game freak you may be disappointed at the lack of motion in most of the pictures, or our special visual effects. We have some dandies, like the mushroom cloud that rises over Hiroshima in our History series, but your learning is not distracted by needless special effects.

OVER 1000 PROGRAMS

We have 64 courses of 16 half-hour programs: 1024 programs! All are easy-reading, upper-and-lower-case. All are in Atari color. All are illustrated by frequent graphics, composed of special and regular characters. And, best of all, every frame of every program is accompanied by high-quality, full-time audio narration by professional voice talent. David Stanton, James Mathers, Pam Barrymore. Recorded and played back, not synthesized or digitized!

– If your child is having trouble with Reading or Math, or if he or she is exceptional, and could benefit from professionally programmed lessons or courses, then you need our educational programs for your Atari 400 or 800 to help your child.

– If you want to build your math skills, we have programs on Numbers and their meanings, Addition, Subtraction, Multiplication, Division, Fractions, Decimals, Percents, Angles, Graphs, Word Problems, Algebra, Statistics. There are ten series in all, 160 math programs. Again, all with color, pictures, and a friendly tutor's voice—all the time.

– If your verbal skills need polishing, try our Talk & Teach programs on the alphabet, spelling skills, and every level of vocabulary; Sight Words or Learn by Phonics; develop Reading Comprehension skills from stories and articles. There's even a series on the Great Classics.

– For self-development, try a 16-program course in Economics or Psychology. Or Supervision, Sociology, Counseling (Personal, School, or Employee), Writing, Business, Philosophy, Government, World History, U.S. History, or Accounting.

– For vocational skills, study our 16-program courses in Electronics, Fluid Power, Auto Mechanics, Shop, Carpentry, Construction, Meat Processing, Military Skills (64 programs), and there are many more.

YOU HAVE WHAT IT TAKES

You'll need your Atari 400 or 800, and the Atari Cassette recorder. And to present the Talk & Teach programs you need the Educational System Master cartridge: it's **$25** from us, if you don't have one.

We say these courses, which are recorded one program per side of C20 to C30 (half hour) cassettes, are the equivalent of a chapter, or perhaps an hours lecture. We've been told that by studying our Economics or Psychology course, a student could pass a secondary or college test for credit. Many who have such credits never learned all that's in these courses. And while some of our courses have 1980 copyrights, most are 1981 and 1982. In U.S. History, for example, you'll learn about America's foreign policy during the Falklands crisis as well as that in the Mideast in 1982. And we're putting this information at your fingertips.

Not sure whether you agree more with Rationalists or Existentialists? Do you commit logical fallacies? Try our Philosophy course. If you're not sure about neurosis or psychosis, classical or instrumental conditioning, then you need our Psychology course. Just how independent is the Federal Reserve? Get Economics, Program 12. Confused about the changes in traditional roles of political parties? It's Government 5. And let our tutor tell you patiently and clearly about measures of dispersion and central tendency. Our Statistics goes through F tests. We even have 16 full-length audio-computer programs with Spanish words and phrases.

Remember, these are all for your Atari! Yes, we've done programs for TRS80 Model I, III, Color, for the Apple and T. I. But that's another story.

Would you like to do something more than play games on your Atari? Tired of squeaks and robotics and want to hear a human voice? Do you want to further your education or help your children along in theirs? Now you can. For just **$9.90**, we'll send you one cassette with 2 programs from the course of your choice, 100% guaranteed to work in your Atari, and you can try us out. Better yet, get one full course of 16 programs on 8 cassettes for only **$59.90**. For full documentation, 32 pre-post tests, fancy binder, 8 cassettes with 16 programs of the course you want, send **$79.00**. That's less than books and tuition for most college classes. And we offer a 10 day, 100% exchange allowance. Does your alma mater? Send us your check, or call us at (405) 288-2301 with your Visa/Master Card number. We'll send your educational software pre-paid. Please allow 15 days delivery. Or see your Atari dealer. He may have some of our courses in stock. You've got nothing to lose but your games!

DORSETT
Educational Systems, Inc.

P.O. Box 1226, Norman, OK 73070
(405) 288-2301

VISA MasterCard

done. The sound effects and background mood sounds are also quite effective. Control of the *worriors*, especially when turning corners, required some education. Overall, the joystick was very responsive.

I recommend Wizard of Wor very highly. It is one of those games in your software library which will retain your attention for some time to come.

FLOYD OF THE JUNGLE

MicroProse Software
One Caribou Court
Parkton, MD 21120
(301) 357-4739
$29.95
32K — Cassette & Diskette

Reviewed by Gordon Miles

One enjoyable way to introduce your friends to your ATARI is to share a computer game. Unfortunately, most games are single-player, or two-player at best. Games for four simultaneous players are few, and usually do not show off the hi-res graphics, sound, or music possible with the ATARI. MicroProse's **Floyd of the Jungle** comes to the rescue by incorporating all these advanced features into a multiplayer, arcade-type game.

After a nicely-animated introduction, each player's name is entered and a point goal selected. The object is to be the first player to reach the point goal. Each player controls a different-colored "Floyd," and starts out at the bottom of the screen. Above the Floyds are seven different tiers. Snakes, elephants, birds, lions, alligators, monkeys, and pygmies prowl each tier. Impassable jungle separates the tiers, and dangling vines are the only means of passage between tiers.

Your Floyd must jump and scamper through the jungle to do the things that are worth points. These include catching birds, punching pygmies, and rescuing Janice, Queen of the Jungle. When a player gets to Janice, the round ends and a different screenful of jungle appears. The game ends when the point goal is reached.

The animation of Floyd and his jungle mates is very good. The snakes rock to and fro. Toothed jaws open and close. Feet shuffle along jungle paths. Floyd himself is especially well done. He literally jumps for vines, rides the animals, and knocks out pygmies. He even appears short of breath! With up to four Floyds scrambling around, it's a zany footrace. The foliage looks real for a change, and the landscape allows actions like jumping for a canoe, leaping off a hill, or defying wild animals.

Timing is very critical. Leap too soon, and Floyd goes into the underbrush, the river, a deadly dart, or possibly some jaws. The penalty is harsh: back to the bottom. This can be extremely frustrating for beginners, but for experienced players, the penalty scheme works well to balance reflex play with the strategic demands of getting points.

The movement in **Floyd** is very fast. Even with four players, there is no apparent slow down. Although **Floyd** requires BASIC, MicroProse uses a proprietary language that uses BASIC only in functions such as titles & score displays. All game action is in machine code.

Other niceties include a handicap for more experienced Floyds (one or two sore legs), pause control, and bonus points for quick recovery of Janice. A solo option exists where Floyd plays against the clock.

FINANCIAL WIZARD

Computari
9607 Athlone
Dallas, TX 75218
$59.95
24K — Diskette

Reviewed by Steve Randall

Like most Atarians I am captivated by the graphic, color and sound capabilities of my machine. Nothing discourages me more than to boot up a program only to be presented with standard Graphics 0 white characters on a blue screen. Of course, the usefulness and effectiveness of a program is primary, but enhancing applications programs with some of the ATARI's charms, in my opinion, is a great asset.

Financial Wizard, a personal finance program by Computari's Bill McLachlan, is an excellent example of an applications program that integrates many ATARI features into a well-conceived program. It requires a disk drive and at least 24K of memory. If you wish, a printer is useful (Centronics 739, Prowriter, Epson with Graftrax, or NEC).

The use of color and sound in the data-input prompts and error-checking routines is so well done that it's quite simple to boot up the disk, follow the very clear documentation, and be "up and running" in short order.

Some of Financial Wizard's features include the ability to search checks by a range of check numbers, range of dates or amounts, as well as by payee or category. When entering checks the last check number is displayed along with the current balance. The program comes with budget categories already set up, and most of them are applicable to most people. Still, it is possible to change any or all of them. With the "replicate" feature these categories, along with the budgeted

continued on next page

amounts, can be carried over from month to month or year to year.

The check-balancer routine is designed to work just like the form included with your bank statement. All of the routines, (check entry, budget entry, tabulation, etc.) allow you to go back and correct any data. I personally feel this is a key feature of Financial Wizard.

One menu selection calculates and tabulates the percentage of outlay each category represents. These figures can be displayed in a very useful bar chart that compares budgeted expenses to actual expenses by category (for a month) or shows one category for each of twelve months. For those interested in complete automation, Financial Wizard will even print your checks. Check writing requires custom checks available from the source mentioned in the owner's manual.

I give Financial Wizard high marks in ease of use, documentation, and performance. If a disk-based home finance package is in your future, the "wizard" should get serious consideration.

SLIME

Synapse Software
5327 Jacuzzi St.
Richmond, CA 94804
(415) 527-7751
$34.95
24K — Diskette & Cassette

Reviewed by David Duberman

Slime is a fiendishly clever, delightfully disgusting game that's guaranteed to give you green dreams for weeks after you get it. There are two objects to the game. First, you must protect your warship, which is floating on a sea of green slime at the bottom of the screen. Second, you must channel the slime falling from above into the Gamma-Tube Absorbers located at the sides of the screen.

As the game progresses, the slime that falls into the ocean causes the level of the ocean (and hence your warship) to rise. This renders your warship increasingly liable to damage from lightning that strikes during the slime storms.

Your deflector warship is supplied with a total of twenty wedges which can be placed strategically in various areas on the screen in order to deflect the slime and protect your ship. You can position the wedges one at a time, or you can create diagonal "sluices" or horizontal "shields" by holding down the fire button and moving the joystick in the desired direction.

There is a Trac-Ball option. There are also many other options, including number of players (1 to 4 — one at a time), bonus levels, and starting storm. There are 50 storms through which you must progress to win, thus 50 levels of difficulty. All the options are presented in a clever menu format on pressing Select, and it is here that you may adapt game specs to your heart's content.

Getting back to the action, there are many obstacles to your two objectives, as you may expect. Plexarian saucers are your primary enemy, and their evil intent is manifested in many ways. First, they seed the clouds to create the slime storms. Then, they remove wedges that you've placed so that the falling slime can ooze through. Occasionally, they'll drop a plug into one of the gamma tubes. Soon thereafter, a friendly helicopter will come to remove the plug, but you must protect the chopper so that it can fulfill its mission.

The instructions say that if you can shoot the saucer, you get 1000 points, but I've been unable to hit it so far. It's very fast. The saucer is also responsible for fireballs which can wreck your wedge formations and sink your ship. The slime will also sink your ship if it falls on it. You start with up to seven ships, and the game is over when the last one is gone, or when the slime level reaches the top of the screen.

My primary source of frustration in playing this game was the good old Atari joystick. This is one game that could really benefit from a heavy-duty ball-trigger-head stick, and even more from a Trac-Ball. The more advanced levels of the game are winnable, but only with a very high degree of control and concentration, not to mention great agility, on the part of the player.

I'm glad to see products like Slime come out, because this game really is an improvement over most other video games I've seen, and compares very favorably with the best of the coin-op games. It tells me that Atari's potential as a fantastic game machine is finally being fulfilled.

PERCOM DOUBLE-DENSITY, DUAL-DRIVE SYSTEM

Percom Data Company
11220 Pagemill Road
Dallas, Texas 75243
(800) 527-1222

Reviewed by Richard DeVore

ATARI owners who have wished for a disk drive system with larger storage capacity — your waiting is over. Percom has responded with a group of drives that deserves your attention. You can select from 40-track, single-head, single-drive systems to 10-megabyte, hard-disk systems.

RFD40-S2 is a 40-track, first-drive system with two single-head, double-density drives and power supply and controller mounted vertically in a single cabinet.

It is a configuration that will serve those who have no drives as well as you who already own one or more ATARI 810 single density drives. The list price is $1105, which compares favorably with the cost of two 810 drives. At the same time, it offers twice the storage as well as being completely compatible with any disk product produced for the ATARI.

When you open the box of the RFD40-S2, you will find the drive, a cable with ends configured for connection directly to your system, an instruction book and a copy of the newest version of OS/A+, Version 4 by Optimised Systems Software, Inc. If you already have an 810 drive, the first thing you will notice is the size of your new unit. It takes up less space than the 810 drive due to the vertical mounting of the drives.

The drive has two switches at the back. These consist of an off/on rocker switch and a set of four dip switches at the rear. These dip switches allow some variety in unit configuration. Switch number four sets the controller drive (the one on the right-hand side) to default to either single or double density, depending on the setting of the switch. Switch number three does the same for the left-hand drive. Default means that if you don't tell the drive anything specific via software, these will be their configurations.

I discussed these switches with the technical support people at Percom and they said it was possible that they would be eliminated in later production. This is because the software allowed you to set drive density as desired.

In testing out the functions, the drives were used by themselves, and in conjunction with both one and two ATARI 810 drives. Regardless of the drive number, everything worked properly, allowing access to any drive as desired. At the present they are set up with one 810 drive which lately has not even been uncovered. This is due to the fact that everything I need to do can be done by the one dual-drive unit. For those with higher storage requirements, there are 40-track, add-on units in single, dual, or triple drive configurations. The prices range from $399 to $1195.

While using the drives over the past month, they loaded programs to zero free sectors and read back all of the stored information without error. I was able to copy from single to double-density and back with no problems. Some programs which depend upon 128 byte sectors, which use note and point, or which are copy protected (obviously), would not function in double-density format.

I tried every program that I could get my hands on and all loaded properly. This included many games as well as Microsoft BASIC and VISICALC. With the dual-drive unit connected in conjunction with an 810, I loaded several cassette-based programs and they also worked properly.

The documentation, however, is rather poor and confuses more than communicates. Percom has assured me that a new instruction booklet is planned and will be understood by the average owner.

Overall, the dual-drive, double-density system functions perfectly. If you feel that you need two drives, this unit deserves serious consideration.

PRODUCT REVIEWS

ARENA 3000

Med Systems Software
P.O. Box 3558
Chapel Hill, NC 27514
(800) 334-5470
$29.95
16K — diskette or cassette

SURE-SHOT JOYSTICK

Spectravision
39 W. 37th St.
New York, NY 10018
(212) 869-7911

Reviewed by David Plotkin

In this review I will discuss two products together. I've found an arcade game with exceptional playability and a new joystick which should enhance the play of most games, particularly the game reviewed here.

ARENA 3000, programmed by Simon Smith, is an original arcade shoot-em-up which keeps the player coming back again and again. The player controls a white robot which is being assaulted from all sides by a wide range of attackers. The robot is armed with a pistol capable of firing multiple shots. Up to four players can be on the screen at one time.

The game is divided into arenas. Clearing the screen of all the attackers allows you to go on to the next screen, or arena. These arenas increase in difficulty in several ways. The attackers move faster, but there's more to it than just an increase in speed. As the levels progress, different kinds of attackers appear, and each attacker moves differently. The number of attackers present at the beginning of each arena also increases, and there can be up to 40 attackers in the arena at one time.

Another way in which the game increases in difficulty is that when you shoot certain types of attackers they mutate into another form. Some of the mutated forms require up to four hits to destroy them. There is a certain fairness here, however, since the attackers requiring more hits to destroy also move slower, and it's easier to run from them.

There are some nice features to this game which increase its enjoyment. When you lose a robot, for example, you don't have to go back to the beginning. You start again with the number of attackers that were left when you were "killed". Since there are fewer attackers when you restart, they now move faster. This increase in speed does not occur if you go all the way through an arena without losing a robot.

The graphics and sound of ARENA 3000 are only fair. There are no fancy titles or music, primarily due to memory limitations of 16K. Within the game itself, the attacking shapes are of medium resolution and are not animated. They move rather smoothly without changing shape.

One interesting effect I have not seen before is the explosions that occur when you hit an attacker or they hit you — you blow apart in a very tall, narrow blast which is clearly done by use of a player, somewhat similar to the explosions in the arcade classic "Robotron".

One of the most unique features of ARENA 3000 is the way in which you control the little robot. You have the choice of using one or two joysticks. If you use one joystick, then you fire using the red button in whatever direction the robot is facing. If you use two joysticks, stick 1 controls the direction you move, stick 2 controls the direction you fire in. At advanced levels, the only way to succeed is to get out near the edges of the screen and fire back into the crowd of attackers while running away, so you can forget using just one joystick. A pair of good quality joysticks, with heavy bases (such as WICO or Baylis) will work quite well

when set on a table. However, even these sticks can shift in the heat of play, ruining your shots. What to do?

A new joystick from Spectravision may be the answer to the needs of ARENA 3000, as well as the other two-joystick games Med Systems has promised. Internally, the **Sure-Shot** is similar to an Atari joystick, although less pressure is needed to activate the stick. Externally, there are two firing buttons — one in the normal position, one on top of the stick. These buttons work simultaneously. The stick is a molded handgrip which nestles to the hand better than any other joystick I've tried.

Lastly, and very uniquely, the Sure-Shot comes with four suction cups which anchor it firmly to formica, glass, or plexiglas table tops. The suction cups (it comes with standard rubber feet as well) keep the joysticks from sliding and two Sure-Shots work very well with ARENA 3000.

LIGHT PEN

Programmer's Institute
P.O. Box 3191, Dept. 1–C
Chapel Hill, NC 27514
$19.95

Reviewed by Ike Hudson

I recently received the light pen that I ordered from Programmer's Institute (PI). At the same time I got one of their programs so I could see exactly how the pen works. Most of PI's programs are for children from pre-school through second grade. The software I ordered, called "Shapes," works with both keyboard input and the light pen.

Shapes is a graphics program that displays a particular shape and four choices that match it to create a new form. You make your choice by entering the number of the block from the keyboard or by pointing the light pen at your selection.

The choices were easy for my eight-year-old and me, but as my son pointed out, it would be more challenging to a younger child. In making selections it was necessary to point at the object in the box. Pointing to just anywhere in the box or at the number did not work. In a few selections it seemed to work only if you pointed a couple of pixels to the left of the object.

The program is written in BASIC and can be listed. This is some help to those of us who like to use different programs or use them to learn how some new hardware works. The code for the light pen is relatively simple. It seems that any average hacker (like me) could probably write some fun software for it in BASIC in a relatively short time.

The light pen comes in a rubbery plastic housing and looks like a ball-point pen with one end cut off and a wire out the other end. It plugs into joystick port number four for use with the PI software, but could be programmed for any port. The housing is relatively simple and not heavy-duty, and may not withstand use by unsupervised juveniles. It should last, however, if used by non-destructive or mature individuals. Although lightweight, it is quite functional and at $19.95 it compares favorably with the $125.00 pen available from Atari.

The pen is a very unsophisticated design that works well with multiple-choice drills or similar educational applications. I think it can be a fun toy, as well as an aid in education, especially for users who aren't typists.

Unfortunately, the light pen has no documentation on how to write programs to use with it. PI said they would be producing an inexpensive series of tutorials in the near future.

I have to give this light pen a good rating. It is a great value for the price and brings the light pen within the reach of all home computer owners and schools.



NOBODY EVER PLAYS JUST ONE HAND OF STRIP POKER.

There's no such thing as a quick game of *Strip Poker.* With two captivating female opponents, this fast-paced program features graphics and game play so realistic that players tend to lose track of time. Decorum forbids that we actually show you what happens on the screen. Suffice it to say that our sophisticated software gives you ample incentive to stretch your poker skills to the limit!

Just to sweeten the pot, we've added two new data disks . . . one with two new female opponents, the other with two males. The action is intense and the stakes are high.

**Apple Data Disks available 4/1/83. Apple and Atari are registered trademarks.*

If you have a keen competitive instinct and don't mind occasionally losing your shirt, see your local computer store or call us for *Strip Poker* today.

Atari (40K) and Apple II (48K) computers, $34.95 Diskette. Additional Data Disks (specify male or female) $24.95 ea.*

Look for these and other Artworx programs at your local computer store. For a free catalog, write or call 800-828-6573. Artworx Software Co., Inc., 150 North Main St., Fairport, NY 14450 (716) 425-2833



Artworx™

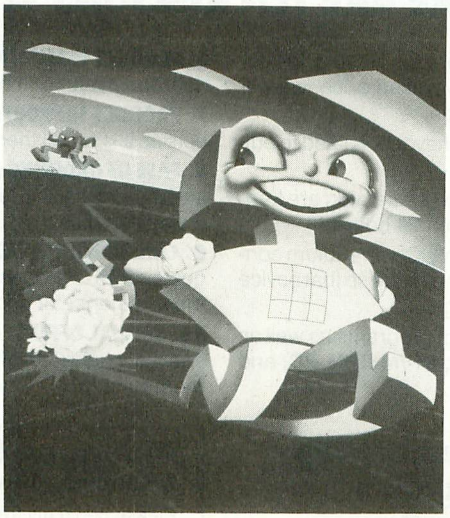
So you can play.

KID GRID

(game)
Tronix, Inc.
701 W. Manchester Blvd.
Inglewood, CA 90301
(213) 671-8440

One of the fastest video games Kid Grid, is designed specifically to take full advantage of the ATARI's great graphic, sound and color capabilities.

The Kid darts around a grid, attempting to connect all the dots. In hot pursuit are four bullies — Squashface, Thuggy, Muggy and Moose — if they catch the Kid, the results are explosive.



Kid Grid

XTRAVIDEO I

(video monitor output)
HARDSEL
P.O. Box 565
Metuchen, NJ 08840
(800) 835-5465
$39.95

This is a plug-in video monitor output module for the ATARI 400. No soldering is required. It uses a standard RCA phono plug and is compatible with most monitors, including the BMC 12.

ATACOMP

(utility)
David Bohlke
192 North Linn Drive
Coggon, Iowa 52218
(319) 435-2031
$34.00

A machine language program that compiles a subset of ATARI BASIC, this program was designed mainly as a graphics game compiler. Using ATACOMP you will be able to write, run and debug BASIC programs without switching any disk files.

TROUBLE SHOOTER I.

(automotive diagnostic)
High Tech. Software
9910 U.S. 395 North
Reno, Nevada 89506
Information (702) 972-3659
Orders only (800) 648-4780
Toll Free / 24 hours / 7 days
16K Cassette
$22.95 (includes shipping)

Get your ailing car or light truck running. You will learn from it. All you need is a BASIC cartridge and some common tools. Three programs chained together produce actual engine sounds to diagnose the problem. Then steps are offered for correction.

STRIP POKER

(game)
Artworx Software
150 North Main St.
Fairport, NY 14450
(800) 828-6573
40K — Diskette
$34.95 (master)
$24.95 (data disk)

Play strip poker against either female or male opponents (stipulate which data disk you want), and enjoy realistic payoffs as you win. Graphics "stretch computer's resolution to the max" according to the Worx.

64K RAM SELECT

(memory expansion board)
Mosaic Electronics, Inc.
P.O. Box 708
Oregon City, OR 97045
$190.00

This plug-in memory board for the ATARI 800 expands total usable RAM memory to 64K, of which 52K is continuous and the remaining 12K is blank-selectable in 4K groupings. The board accomodates any 8K ROM addressing requirements without interfering with the bank-select system.

RS232 MATRIX

Bit 3 Computer Corp.
8120 Penn Avenue South
Minneapolis, MN 55431
(612) 881-6955
$89.00

Any two RS232 plugs of either gender can be connected with this device; and any of the pins cross-connected, if desired, by sliders on the ten-by-ten matrix. Nine LEDs report status of connected wires.

BANK STREET WRITER

(word processor)
Broderbund Software
1938 Fourth Street
San Rafael, CA 94901
(415) 456-6424
48K — Diskette
$69.96

The first truly home-oriented word processing system, Bank Street Writer was heavily tested among students and young adults, and is designed to be easy for the whole family. Every function and command is fully and clearly prompted on screen. Many powerful features are included. Bank Street Writer requires a disk drive and 48K RAM, and comes with a special tutorial.

TYPO REVISITED

Type your program once

by BILL WILKINSON

TYPO appeared in Volume 1, Number 3 of ANTIC. We reprint it here as a service to our thousands of new readers. Bill Wilkinson, President of Optimized Systems Software, was one of the original designers of ATARI BASIC.

"TYPO" is designed to help you find typing errors made when entering BASIC programs published in ANTIC. When used properly, TYPO will produce a table of values which can be used to pinpoint where an error was made. ANTIC will publish a table with every BASIC listing, and the user may compare the two tables to ensure they are identical. If they are not, then the user presumably made a "typo" which needs to be corrected.

How To Use TYPO

1. Enter program listing #1 EXACTLY as shown.
2. LIST this program to disk (LIST "D:TYPO.LIS") or cassette (via LIST "C:"). When using a cassette, use an entire blank cassette for just this program.
3. Type NEW to clear memory.
4. Type in a program from the magazine.
5. LIST this program to the disk (LIST "D:NAME") or cassette (LIST "C:"). Type NEW and reenter the program (ENTER "D:NAME" or ENTER "C:").
6. Append the TYPO program onto the end of the program from the disk (ENTER "D:TYPO.LIS") or cassette (ENTER "C:").
7. Type GOTO 32000 and a checksum table will be printed on your screen. Compare this table with the one published, if they agree you are finished and the program should run.
8. Note the value of the "Variable checksum" printed on the screen, and keep it handy.
9. If the table does not agree with the published table, examine the lines which have codes and/or lengths which disagree. Correct any errors.
10. IF AND ONLY IF the variable checksum you noted agrees with that printed in the magazine, go to step 7 above and try again.
11. If the variable checksums do NOT agree, you MUST go to step 5 above and perform the listing and re-entering ritual! You may skip step 6, however, since presumably you have the combined programs now LISTed together.

Follow these instructions exactly!

What TYPO Is Telling You

THIS PROGRAM IS FUSSY! It cares about every little period, comma, and even spaces. It also cares about the order in which you typed in program lines! The order in which the variable names are stored depends upon the order the lines were typed. Should this order be altered the values of the tokens and the subsequent checksums will be altered.

The "Variable checksum" is used to correct for some of this by producing an (almost) unique checksum which depends on the order in which the variables are stored. If your checksum doesn't agree, you have either entered lines in the wrong order or misspelled a variable name. In either case, you MUST correct your error(s) and then go through the LIST / NEW / ENTER sequence to assure that the variables are put back in order.

The length shown is the number of bytes encountered by TYPO within the line number range shown. The two letter code is essentially a checksum of "length" bytes within that same range. If the length is correct and the checksum is off, you have made a spelling or punctuation error. Watch out: since all keywords and operators (including two character operators such as " =") are tokenized as one byte, the length might stay the same even though you type SETCOLOR for CLR. Note!! You MAY use abbrevations for keywords as long as the LISTed result conforms to the magazine listing.

If the length bytes disagree,you have added or deleted characters. If nothing obvious shows, pay special attention to characters in quoted strings and/or REMark statements. It is easy to omit a space or punctuation in a REMark, thinking that "REMarks don't matter"; but to TYPO they do.

This is a small but sophisticated program, use it and typing errors will be reduced.

NOTE: *TYPO ask for output file. Respond with S for television or P for printer.*

```
32000 REM Type Your Program Once -- "TYPO"
32100 CLR :DIM Q$(20):QF=7:CLOSE #QF:?
      "File for output ";
32110 INPUT Q$:OPEN #QF,12,0,Q$:QREM=0
32130 QCNT=1:FOR QADDR=PEEK(130)+256*
      PEEK(131) TO PEEK(132)+
      256*PEEK(133)-1
32140 QSUM=QSUM+PEEK(QADDR)
      *QCNT:QCNT=QCNT+1:NEXT QADDR
32150 ? #QF;"Variable checksum = ";
      QSUM:? #QF
32160 QADDR=PEEK(136)+256*PEEK(137):?
      #QF;"   Line num range    Code  Length"
32170 QLINE=PEEK(QADDR)+256*PEEK
      (QADDR+1)
32180 IF QLINE>=32000 THEN END
32190 QLEN=0:QSUM=QLEN:QCNT=QLEN:?
      #QF;"    ";QLINE,"- ";
32200 IF NOT (QCNT<12 AND QLEN<500 AND
      QLINE<32000) THEN 32270
32220 QLEN=QLEN+PEEK(QADDR+2):QCNT=
      QCNT+1
32230 IF PEEK(QADDR+4)=0 AND QREM THEN
      QADDR=QADDR+PEEK(QADDR+2):
      GOTO 32260
32240 FOR QADDR=QADDR TO QADDR+PEEK
      (QADDR+2)-1
32250 QSUM=QSUM+PEEK(QADDR):
      NEXT QADDR
32260 Q$=STR$(QLINE):QLINE=
      PEEK(QADDR)+256*PEEK
      (QADDR+1):GOTO 32200
32270 QSUM=QSUM-676*INT(QSUM/676):
      QCNT=INT(QSUM/26)
32280 ? #QF;Q$,CHR$(65+QCNT);
      CHR$(65+QSUM-26*QCNT);
      "      ";QLEN
32290 GOTO 32180
```

TYPO TABLE

Variable checksum = 50796

Line num range	Code	Length
32000 – 32200	QD	518
32220 – 32290	WQ	310

Result of using TYPO to check itself

(MUST have changed 32000 to 32500 in lines 32180 and 32200 first!)

AUTO PILOT *continued from page 66*

```
  10 R:          MENU.SYS
  20 R:AN AUTOMATED MENU SYSTEM
  30 R:           PART 1
  40 R: ANTIC #7 --- KEN HARMS
  50 R:
  60 C:@B752=1 [TURN OFF CURSOR
  70 C:@B709=154 [TURNS ON LETTERS
  80 U:*FACE
  90 T:HI! \
 100 U:*OPEN
 110 T:PLEASE \
 120 U:*PUCKER
 130 T:WAIT
 140 U:*HALF
 150 T:JUST \
 160 U:*TIGHT
 170 T:A MINUTE.
 180 U:*OPEN
 190 U:*SMILE
 200 LOAD D:DIRECT.SYS
1470 R:
1480 *FACE
1490 POS:2,5
1500 R: USE CTRL Ps, reverse CTRL
     Ys,            and
     CTRL Ys. CTRL F, G,
     & N for        mouth.
1510 T:       ♣♣♣
1520 T:    ♣♣       ♣♣
1530 T:  ♣             ♣
1540 T:  ▌ ▐        ▌ ▐
1550 T:  ▌      ●      ▐
1560 T:  ▌             ▐
1570 T:  ▌  ◣▂▂▂◢  ▐
1580 T:  ▌             ▐
1590 T:    ◣▂▂▂▂▂▂◢
1600 T:
1610 PA:30
1620 E:
1630 *SMILE
1640 U:*SETXY
1650 POS:7,11
1660 T:◣▂▂▂◢
1670 POS:7,12
1680 T:     [ERASES MOUTH BOTTOM
1690 PA:5
1700 U:*RESETXY
1710 E:
1720 *OPEN
1730 U:*SETXY
1740 POS:7,11
1750 T:◢▔▔▔◣
1760 POS:7,12
1770 T:◣▂▂▂◢
1780 PA:5
1790 U:*RESETXY
1800 E:
1810 *TIGHT
1820 U:*SETXY
1830 POS:7,11
1840 R: CTRL U
1850 T:▆▆▆▆▆
1860 POS:7,12
1870 T:     [TYPE 5 SPACES
             AFTER COLON
1880 PA:5
1890 U:*RESETXY
1900 E:
1910 *PUCKER
1920 U:*SETXY
1930 POS:7,11
1940 T:▂◢▔◣▂
1950 POS:7,12
1960 T:▔◣▂◢▔
1970 PA:5
1980 U:*RESETXY
1990 E:
2000 *HALF
2010 U:*SETXY
2020 POS:7,11
2030 T:▂▂▂▂▂
2040 POS:7,12
2050 T:◣▂▂▂◢
2060 PA:5
2070 U:*RESETXY
2080 E:
2090 R:
2100 *SETXY
2110 R: STORES CURSOR POSITION
2120 C:#X=@B85      [GET X COORDINATE
2130 C:#Y=@B84      [GET Y COORDINATE
2140 E:
2150 R:
2160 *RESETXY
2170 R: RESTORES CURSOR POSITION
2180 C:@B85=#X
2190 C:@B84=#Y
2200 E:
2210 R:
```

```
 200 R:         DIRECT.SYS
 210 R:PART 2 OF PILOT AUTOMATED MENU
 220 R:           ANTIC #7
 230 R:         K.W. HARMS
 240 R:
 250 U:*INITIALIZATION
 260 C:$DIR=D:*.* [WILDCARDS GET ALL FILES
 270 C:@B1373=2  [OPEN DIRECTORY FLAG
 280 R: CTRL F,17 M's,G
 290 T:◢▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔◣
 300 R:
 310 *DIRECTORYLOOP
 320 R:READ 1st 20 GOOD FILES
 330 READ:$DIR $FILENAME [READ DIRECTOR
 340 J(@B228=136):*FINI   [END OF FILE
 350 A:=$FILENAME
 360 M:FREE SECTORS
 370 JY:*FINI              [JUMPS ON FREE
                            SECTORS ITEM
 380 M:SYS_ [                MATCHES TO FIND
                             SYS FILES
 390 R:                    THE [ MUST BE
                           AT THE UNDERLINE!
 400 JY:*DIRECTORYLOOP
 410 C:#F=#F+1             [ADD 1 TO FILE #
 420 C:@B#P=13             [CUT OFF AFTER 13
 425 R:NEXT 2 LINES CTRL V & B ON
     EITHER          SIDE
     OF STRING
```

```
430 T(#F<10):▐#F  =$FILENAME▐
440 T(#F>9):▐#F =$FILENAME▐
450 J(#F<20):*DIRECTORYLOOP
460 J:*FINI
470 R:END OF PRINTING FILES
480 R:
490 *QUESTION
500 R:ASK FOR FILE NUMBER
510 POS:2,15
520 T:                    [ERASE LINE
530 T:                    [ERASE LINE
540 POS:2,15
550 U:*TIGHT
560 T:TYPE \
570 U:*HALF
580 T:NUMBER \
590 U:*OPEN
600 T:FOR
610 U:*PUCKER
620 T:THE PROGRAM \
630 U:*HALF
640 T:YOU
650 U:*TIGHT
660 T:WISH \
670 U:*PUCKER
680 T:TO \
690 U:*HALF
700 T:RUN.
710 U:*SMILE
720 *ENTRYLOOP
730 R:GET AN ANSWER & CHECK IT
740 C:@B752=0 [TURN ON CURSOR
750 POS:8,19
760 A:#A
770 T(#A<1)+(#A>#F):SORRY, TRY AGAIN.
780 J(#A<1)+(#A>#F):*ENTRYLOOP
790 R:
800 R:THE READ FILE AND COUNT LOOP
810 C:@B1373=2
820 C:#F=0
830 *READLOOP
840 READ:$DIR $FILENAME
850 A:=$FILENAME
860 M:SYS_
870 JY:*READLOOP      [SKIP SYS FILES
880 C:#F=#F+1
890 J(#F=#A):*RUNNER [FOUND FILE, JUMP
900 J:*READLOOP       [FILE NOT FOUND
910 R:
920 *RUNNER
930 R: INSERTS D: AT FRONT OF FILENAME
940 R:  #P = POINTER TO DATA LENGTH
950 R:  #R = BYTE ADDRESS TO READ
960 R:  #W = BYTE ADDRESS TO WRITE
970 R:  #V = VALUE TO READWRITE
980 R:  #C = COUNTER
990 C:@B#P=14 [CUTS TO 2 SPACES PLUS
    A       LENGTH
    OF 11 PLUS 1 FOR DOT
1000 C:#W=#P+1 [FIRST CHARACTER
1010 C:@B#W=68 [ASCII VALUE FOR D
1020 C:#W=#P+2 [SECOND CHARACTER
1030 C:@B#W=58 [ASCII VALUE FOR :
1040 R:
1050 R: EXPAND FILENAME AFTER D:+8
                LETTERS
1060 C:#R=#P+13 [SET READ ON LAST CHAR.
1070 C:#C=0
1080 *EXPANDLOOP
1090 C:#C=#C+1
1100 C:#W=#R+1 [WRITE HIGHER THAN READ
1110 C:#V=@B#R [READ VALUE @ #R
1120 C:@B#W=#V [WRITE THAT VALUE
1130 C:#R=#R-1 [MOVE EVERYTHING LEFT
1140 J(#C<3):*EXPANDLOOP [PERFORM 3 TIMES
1150 R: INSERT A DOT
1160 C:#W=#P+11 [THE EMPTY SPACE
1170 C:@B#W=46 [ASCII VALUE FOR PERIOD
1180 R:
1190 R: DELETE BLANKS IN 1ST 8 LETTERS
1200 C:#R=#P+2 [SET READ TO 2ND LETTER
1210 C:#C=0
1220 *DELETELOOP
1230 C:#C=#C+1
1240 C:#V=@B#R [READ VALUE
1250 C(#V=32):
     #W=#R [A 32 IS A BLANK,
                 SET
     WRITE ADDRESS TO
     READ            ADDRESS
     IF BLANK
1260 J(#V=32):*MOVELEFT
1270 C:#R=#R+1 [IF NOT BLANK,
     GET READY             TO
     READ NEXT LETTER
1280 J(#C<7):*DELETELOOP [DO 7 TIMES
1290 J:*LOADER [NO BLANK FOUND, LOAD
1300 R:
1310 *MOVELEFT
1320 R: MOVES DOT AND EXTENSION DOWN
     TO        ELIMINATE
     BLANKS
1330 C:#R=#P+11[SET READ ON DOT
1340 C:#C=0
1350 *MOVELEFTLOOP
1360 C:#C=#C+1
1370 C:#V=@B#R [READ VALUE
1380 C:@B#W=#V [WRITE PER #W IN
     DELETE              LOOP
1390 C:#R=#R+1 [NEXT LETTER
1400 C:#W=#W+1 [NEXT LETTER
1410 J(#C<4):*MOVELEFTLOOP [DO 4 TIMES
1420 R:
1430 *LOADER
1440 GR:QUIT [RESETS SCREEN
1450 LOAD $FILENAME
1460 R:END OF MAIN PROGRAM
1470 R:
1480 *FACE
1490 POS:2,5
1500 R: USE CTRL Ps,
    reverse CTRL Ys,         and
    CTRL Ys.
    CTRL F, G,
    & N for         mouth.
1510 T:       ♣♣♣
1520 T:    ♣♣     ♣♣
1530 T:  ♣           ♣
1540 T:  ▐  ▐     ▐  ▐
1550 T:  ▐     ●     ▐
1560 T:  ▐           ▐
1570 T:  ▐  ╲▂▂▂╱   ▐
1580 T:  ▐           ▐
1590 T:    ╲▂▂▂▂▂▂╱
```

continued on next page

```
1600 T:
1610 PA:30
1620 E:
1630 *SMILE
1640 U:*SETXY
1650 POS:7,11
1660 T:⧅▄▄▄⧄
1670 POS:7,12
1680 T:      [ERASES MOUTH BOTTOM
1690 PA:5
1700 U:*RESETXY
1710 E:
1720 *OPEN
1730 U:*SETXY
1740 POS:7,11
1750 T:⧄▀▀▀⧅
1760 POS:7,12
1770 T:⧅▄▄▄⧄
1780 PA:5
1790 U:*RESETXY
1800 E:
1810 *TIGHT
1820 U:*SETXY
1830 POS:7,11
1840 R: CTRL U
1850 T:▆▆▆▆▆
1860 POS:7,12
1870 T:      [
1880 PA:5
1890 U:*RESETXY
1900 E:
1910 *PUCKER
1920 U:*SETXY
1930 POS:7,11
1940 T:▄⧄▀⧅▄
1950 POS:7,12
1960 T:▀⧅▄⧄▀
1970 PA:5
1980 U:*RESETXY
1990 E:
2000 *HALF
2010 U:*SETXY
2020 POS:7,11
2030 T:▄▄▄▄▄
2040 POS:7,12
2050 T:⧅▄▄▄⧄
2060 PA:5
2070 U:*RESETXY
2080 E:
2090 R:
2100 *SETXY
2110 R: STORES CURSOR POSITION
2120 C:#X=@B85      [GET X COORDINATE
2130 C:#Y=@B84      [GET Y COORDINATE
2140 E:
2150 R:
2160 *RESETXY
2170 R: RESTORES CURSOR POSITION
2180 C:@B85=#X
2190 C:@B84=#Y
2200 E:
2210 R:
2220 R:
2230 *INITIALIZATION
2240 C:$FILENAME=DUMMYSPACESTO15
2250 R:THIS STRING MUST BE FIRST
2260 R:VARIABLE USED.  IT RESERVES SPACE
     IN THE VARIABLE TABLE
2270 C:#P=@178[  START OF STRING SPACE
2280 C:#P=#P+8+1
2290 R:ADDS TO SKIP
     BYTES NAME LENGTH &         NAME
     ITSELF, LEAVES
     #P ON DATA             LENGTH
2300 C:@B82=20         [MOVE MARGIN
2310 POS:20,1        [GETS TO NEW MARGIN
2320 E:
2330 R:
2340 *FINI
2350 R:CTRL G, 17 N's, F
2360 T:⧅▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄▄⧄
2370 CLOSE:$DIR
2380 C:@B82=2
2390 R:POS:0,2
2400 J:*QUESTION
2410 R:END OF PROGRAM
```

```
10 REM GENERATES AN AUTORUN.SYS FILE
20 REM TO READ A PILOT PROGRAM NAMED
25 REM MENU.SYS.  THIS PROGRAM RUNS
30 REM UNDER THE BASIC CARTRIDGE
40 REM ANTIC #7
50 REM KEN HARMS
60 OPEN #2,4,0,"E:"
70 ? "INSERT DESTINATION DISK, PRESS
   RETURN":GET #2,Q
80 OPEN #1,8,0,"D:AUTORUN.SYS"
90 FOR X=1 TO 500
100 READ Y:IF Y=-1 THEN 140
110 LET NUM=NUM+Y
120 PUT #1,Y
130 NEXT X
140 CLOSE #1
150 ? "NUMBER CHECK = ";NUM
160 ? "CORRECT NUMBER IS 11665"
170 ? "END OF JOB"
180 DATA 255,255,0,6,112,6,173,31,208,41,
    4,240,10,169,18,141,33,3,169,6,141,34,
    3,96,251,243,51,246,33,6
190 DATA 163,246,51,246,60,246,76,228,
    243,0,238,33,6,172,33,6,192,53,208,10,
    169,0,141,33,3,169,228,141,34,3
200 DATA 185,59,6,160,1,96,67,58,64,66,55,
    49,50,61,55,48,155,67,58,64,66,55,
    48,57,61,49,52,56,155,67
210 DATA 58,64,66,53,56,48,61,49,155,76,
    79,65,68,32,68,58,77,69,78,85,46,
    83,89,83,155,82,85,78,155,226
220 DATA 2,227,2,0,6,224,2,225,2,17,6,-1
```

TYPO TABLE

Variable checksum = 73747

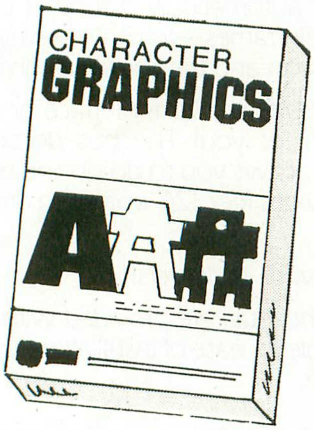
Line num range		Code	Length
0	– 100	DG	366
110	– 210	RP	522
220	– 220	WY	37

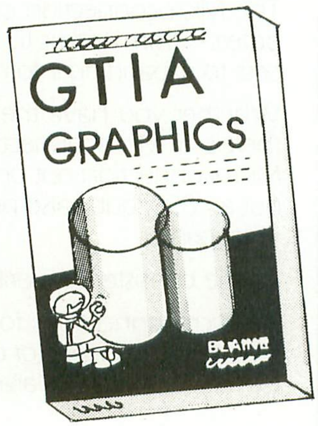
EDUCATIONAL SOFTWARE

PROUDLY PRESENTS

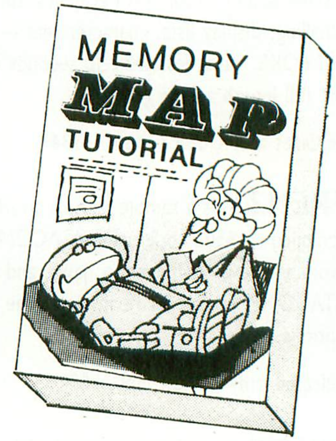
TRICKY TUTORIALS™ 8 Thru 11

FOR ATARI® COMPUTERS









16K TAPE OR 32K DISK ONLY $29.95 EACH!

#8 - Create and animate your own character sets using the same methods used in many of your favorite games. Includes a great editor, utilities, examples, and a complete Space Invaders look-alike, all explained in detail.

#9 - Learn to use Graphics modes 9, 10 & 11 giving you 16 shades or 9 colors, all from BASIC. Create programs never before possible such as three dimentional shapes and digitized pictures, all explained in great detail.

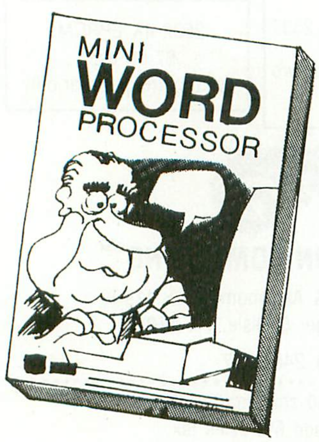
#10 - Find that perfect sound effect for your games and programs. Includes over 50 effects ready to use and explains how they were written. Special utilities are included to allow you to develop your own sound effects.

#11 - Our famous Memory Map now COMES ALIVE in this TUTORIAL. Included are thirty of the most useful POKE locations within the ATARI, each fully explained with interactive examples. See the tricks you have always heard about.

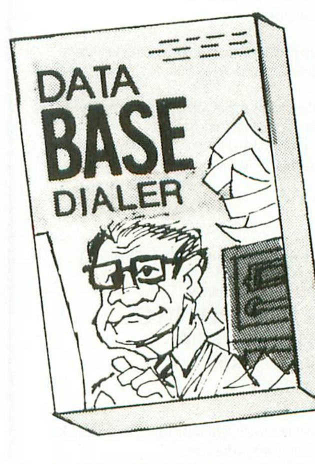
ESI
PROGRAM EXCHANGE
EDUCATIONAL SOFTWARE inc.

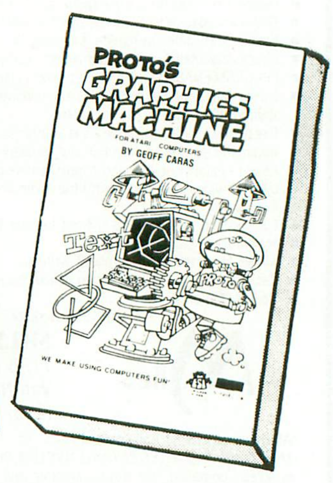
OUR NEW PROGRAM EXCHANGE

FEATURING THE FINEST PROGRAMS FROM AUTHORS AROUND THE WORLD:

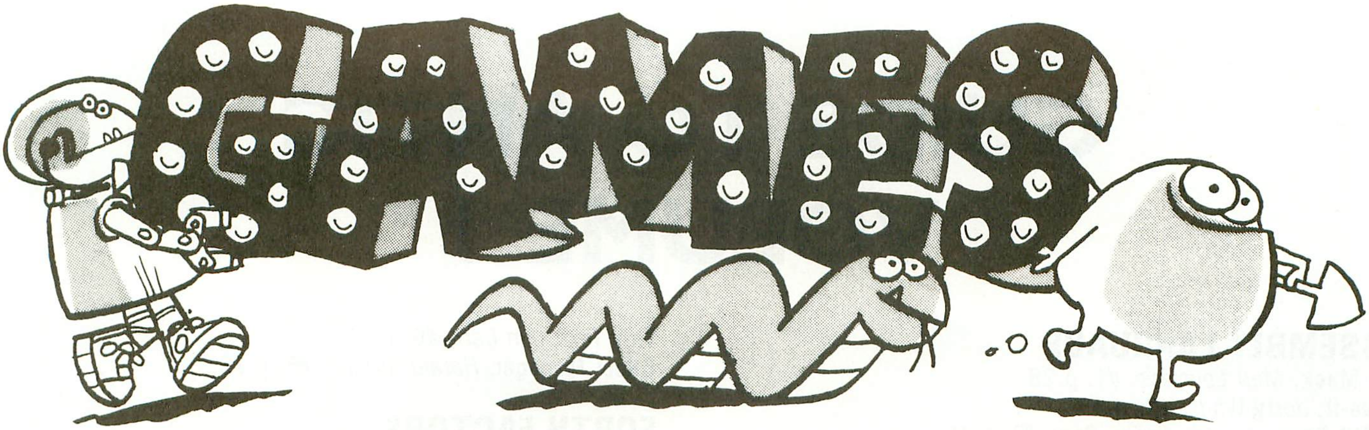








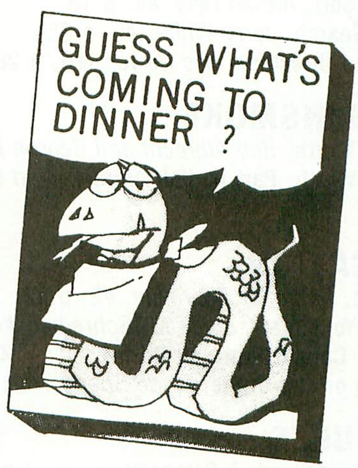
THE ESI PROGRAM EXCHANGE OFFERS A $24.95 WORD PROCESSOR (TAPE OR DISK), A $19.95 GRAPHICS TOOL THAT USES SINGLE WORD COMMANDS, A FAMOUS CHARACTER EDITOR FOR ONLY $19.95, A DATABLE PROGRAM ($24.95) THAT ACTUALLY DIALS YOUR PHONE AS WELL AS KEEP YOUR RECORDS, AND OVER 20 MORE!



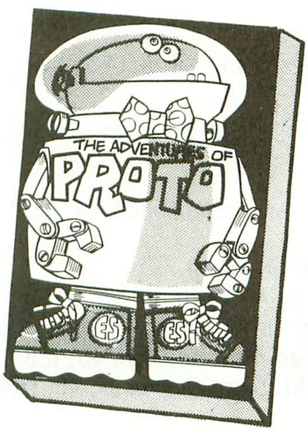
AN ADVANCED ARCADE GAME



Diggerbonk! contains the following ingredients: Orange Whirlers, Pulsing Greenies, Twinklers, Bombs, Fog, Purple Gurples, Yellow Blinkers, Aqua Chasers (watch out), and of course the PANIC BUTTON.



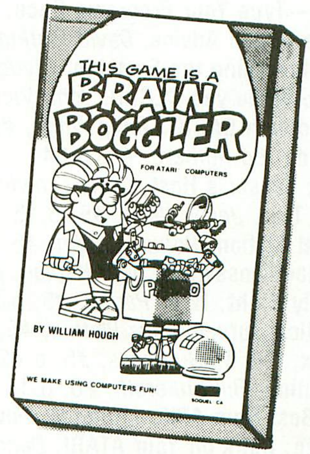
For those of you who always wanted a pet snake, this game is for you. What do you feed a guest like this? An ample supply of insects, of course, but be aware that snakes often wind up biting themselves or getting electrocuted on their cage walls if not properly trained. Difficulty levels for all ages. $24.95.



Prototype the Robot needs the help of your child, 4 or older. His busy day includes catching marshmallows being dropped by friendly Aliens, Coloring pictures, and Playing tunes on his piano. $24.95

ONLY $29.95

Diggerbonk! is the first arcade style game with a continuously scrolling maze that never repeats. You must guide your Digger upward before it goes off the bottom of your screen. There are, however, a few problems you must BONK! along the way (see ingredients). To add to the complication, you need to BONK! the creatures in a specific order. Playable by all ages, but be prepared to end up with a NEGATIVE SCORE.



Do you like to challenge your mental powers? Try to solve this color matching puzzle in less than 11 moves. Play it against the computer or a human. Easy you say? SURE $16.95

PROGRAM EXCHANGE
EDUCATIONAL SOFTWARE Inc.

AVAILABLE FROM DEALERS WORLDWIDE.

WRITE FOR A CATALOG OR CALL FOR ORDERING INFORMATION

VISA/MC/COD: (800) 692-9520 OR (408) 476-4901

4565 Cherryvale Ave., Soquel, Ca. 95073

GUIDE TO ANTIC VOLUME I

continued on page 126

PILOT YOUR ATARI

PRODUCT REVIEWS

PRODUCT SURVEYS

TAPE TOPICS

STARTING LINE

SYSTEMS GUIDE

PUBLIC DOMAIN SOFTWARE

ANTIC is pleased to offer a library of Public Domain Software for the ATARI computers currently comprised of nine disks. These programs are not yet available on cassette. These disks contain unprotected material from the libraries of ATARI users' groups from around the country. There are three disks of games, two disks of graphics and sound demos, and one disk containing a number of digitized photographs. Also, there are two disks of utilities, and one disk containing music files requiring the Music Composer cartridge.

The potential buyer should note that these programs are sold *as is*. Their usefulness may depend on your experience with the computer. They may contain programming quirks that require some modification. However, all perform reasonably well. Contents of the disks may vary slightly from the published description due to unforeseen circumstances, but each disk is filled to reasonable capacity with useful programs of the kind described, and represent an excellent value at $10.00 each, plus $1.50 per order in U.S. funds for shipping/handling. Send check or money order (payable to ANTIC Publishing), and disk number(s) to: **Public Domain Software, 600 18th Street, San Francisco, CA 94107.** *Allow four weeks for delivery.* All orders are sent by First-Class Mail. Please add 6½% sales tax for California residents.

ANTIC GAMES DISK #1

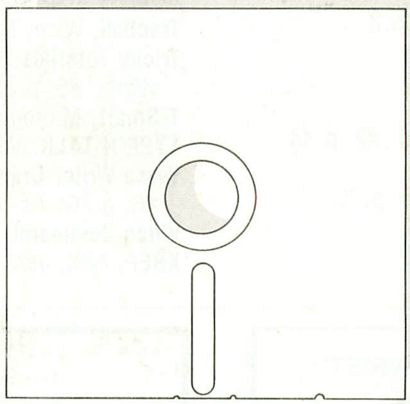
1. Chicken: a great game from ANTIC #1
2. Hangman: the traditional word game
3. Creation: a version of Life
4. Reverse: order of string numbers
5. Monopoly: computerized!
6. Lunar lander: select terrain (stick)
7. Escape: guide ships thru maze (stick)
8. Zonex: hidden color patterns in grid
9. Clewso: detective adventure, graphics
10. Puff: the Magic Dragon

ANTIC GAMES DISK #2

1. Speed Demon: from ANTIC #4
2. Guy's Grid Game
3. Deathstar: from ANTIC #2
4. Blackjack: Vegas rules
5. Civil War: a strategic simulation
6. Artillery: firing strategy game
7. Super Wumpus: text adventure
8. Reckless Driving: avoid collisions (stick)

ANTIC UTILITY DISK #1

1. Doc: program allows you to accompany programs with separate documentation on disk
2. Microassembler: allows you to create USR routines-assembler, more
3. Assembler-Editor: BASIC, slow but versatile
4. Num: automatic line numbering utility in BASIC
5. Memtest: runs without BASIC cartridge, to test all memory
6. Pattern: graphics demo, documented
7. Color: 128 colors at once
8. Printnop: connect parallel printer from jacks 3 & 4



ANTIC UTILITIES DISK #2

1. Bubble Sort: from ANTIC #4
2. Typo: from ANTIC #3
3. Home inventory
4. KEY 6: Cipher coding
5. Renumber
6. Compare: listings for differences
7. SUPER: menu
8. Disk label
9. Modem
10. RT clock & more

ANTIC GRAPHICS DEMO #1

1. Spider: from ANTIC #3
2. Moire
3. Rainbow
4. Horses
5. ATARI logo
6. Pallette
7. Oxygen
8. Spiral
9. Pretty
10. Message and more

ANTIC GAMES DISK #3

1. Petals
2. Showdown
3. FROG: from ANTIC #3
4. Tank Battle
5. Draw: Guy Hurt
6. Plus Zero
7. Collisi, and more

ANTIC GR. & SO. DEMO #1

1. Graphic
2. Draw
3. Rainbow
4. Giggle
5. Tune Rite
6. Etch Sketch
7. Baby Pro Sound and more

ANTIC MUSIC DISK #1

Requires Music Composer Cartridge

1. Prelude
2. Joplin
3. In My Life
4. Work Week
5. Star Trek
6. Daisy
7. Moon River
8. Greensleeves
9. Yellow Submarine, and many more

ANTIC PHOTO GRAPHICS

Digitized Photos

ANTIC presents these programs in diskette form for the convenience of the ATARI community, in the belief that all of the programs offered are in the Public Domain and that no proprietary interests or rights to these programs are claimed by anyone. These diskettes are not copyprotected, nor does ANTIC claim rights to the programs themselves. The price of the diskettes is based on the cost of making them available.


The ELIMINATOR
Now for the
• ATARI
• APPLE
• TRS-80
You're the pilot of The Eliminator, a space fighter of the Defender Class. Your ship can respond with lightning speed, and it's armed to the teeth with awesome firepower.
But you're outnumbered! And your attackers are relentless. Your only options are victory or a grave in space.
FEATURING SPECTACULAR
SUPER SHARP
GRAPHICS & SOUND
"THE BEST ARCADE-TYPE GAME I'VE SEEN . . . GREAT FIRE POWER!"
ROB McCONNELL, ARCADER
"NOTHING MATCHES ELIMINATOR FOR SHEER FUN. I CAN'T STOP PLAYING!"
PAT HENDERSON, ARCADER
APPLE VERSION BY JOHN ANDERSON
ATARI VERSION BY STEVE COLEMAN
TRS-80 VERSION BY WAYNE WESTMORELAND & TERRY GILMAN
APPLE 2 - 48K DISK (DOS 3.3 REQ'D.) 042-0134 $29.95
ATARI - 16K TAPE 050-0134 $24.95
ATARI - 32K DISK 052-0134 $24.95
TRS-80 - 16K TAPE MODEL 1 OR 3 010-0134 $19.95
TRS-80 - 32K DISK MODEL 1 OR 3 012-0134 $24.95
Adventure © 1981
INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC.
BOX 3435, LONGWOOD FL 32750
(305) 862-6917 (QUESTIONS)
ORDER FROM YOUR FAVORITE DEALER
or CALL TOLL FREE (800) 327-7172 (ORDERS ONLY PLEASE)
SHIPPING & HANDLING ARE EXTRA. PRICES SUBJECT TO CHANGE WITHOUT NOTICE
WRITE FOR OUR FREE 150 PROGRAM CATALOG
ART © 1981 - DON DIXON

GOTO DIRECTORY

ALABAMA

RAINBOW CITY SERVICE CENTER
244 Rainbow Plaza
Gadsen, AL 35901
205-442-5384
Factory authorized service on ATARI VCS and computers. Parts and accessories.

ARIZONA

COMPUTER WAREHOUSE
2222 E. Indian School Rd.
Phoenix, AZ 85016
800-528-1054
602-954-6109
ATARI 400 & 800 computers and peripherals at the best prices in the country. Call 1-800-528-1054. Ask about our ATARI 800 special system and the ATARI 400 Pac-Man special. We ship nationwide.

CALIFORNIA

THE SOFTWARE STORE
11768 West Pico
Los Angeles, CA 90064
213-473-1136
Software for ATARI computers. APX—third party—ATARI books-magazines.

HW COMPUTERS
19511 Business Center Drive
Northridge, CA 91324
213-886-9200
Full line of personal computers. Atari, TRS-80, Fortune, NEC, California Computer Systems. Complete line of software and hardware. Authorized Service Center. Other locations: Westwood, Redondo Beach and Palm Springs.

DIMENSIONAL SOFTWARE
3954 Clairemont Mesa Blvd.
San Diego, CA 92117
714-275-4243
Software/books/peripherals/hardware

SOFTWARE EMPORIUM
4500 El Camino Real
Los Altos, CA 94022
415-941-8788
1800 S. Bascom Ave.
Campbell, CA
408-377-9311
Complete software selection for ATARI, Apple, Tandy, IBM, CP/M, books, magazines, games.

SUNSET COMPUTERS
2329 Irving
San Francisco, CA 94122
415-665-7378
ATARI hardware, software, peripherals. Repairs—Northstar, Franklin, Osborne, Kaycomb. Books, magazines.

DATA BANKS
3820 Peralta Blvd.
Fremont, CA 94536
415-790-1060
Hardwdare/software/services/peripherals and a full line of supplies for all ATARI products.

3E SOFTWARE AND SYSTEMS
22408 Mission Blvd.
Hayward, CA 94541
415-537-3637
Complete ATARI support center for hardware and software. ATARI, AXLON, OKIDATA, BIT 3, ALIEN, GROUP, BMC, PID, SYNAPSE, ON-LINE, SWIFTY, EPYX GEBELLI, DATASOFT, BRODERBUND, QS, SIRIUS, OSS, EPSON, ARTWORKX, & MORE.

P.C. COMPUTERS
10166 San Pablo Ave.
El Cerrito, CA 94530
415-527-6044
Software/books.

COMPUTERLAND
1815 C Ygnacio Valley Rd.
Walnut Creek, CA 94590
415-935-6502
Wide selection of software for ATARI. Programming seminars. IBM & Altos computers. Books, magazines.

ELECTRONIC FANTASY
2078 Vallo Fashion Park
Cupertino, CA 95014
ATARI computers & large selection of software. Repairs.

THE SOFTWARE CENTER
4720 Geary Blvd.
San Francisco, CA 94118
415-751-2231
An authorized ATARI dealer with the largest selection of ATARI software in S.F. Cartridges, tapes, discs, memory cards, joysticks, books, magazines, games.

COMPUTER PALACE
1670 Market St.
Redding, CA 96001
916-221-1312
Hardware from Apple-ATARI-NEC-Franklin-Commodore. Largest selection of books & magazines in Northern CA. Full line of game-educational-application software.

COMPUTER PLACE
1029 E. Broadway
Glendale, CA 91205
213-241-2551
Hardware/software/peripherals—memory expansion—ATARI voice box. Printers & color monitors—APX—modems—user group. Latest HW/SW—new products—repair all hardware—extension service policy. Mailing list.

COMPUTER STORE INT'L
215 N. Central Ave.
Glendale, CA 91207
213-243-7669
Apple—ATARI—Eagle—Franklin—NEC—largest selection of software, hardware, books and magazines you are ever likely to see under one roof. Call for hard to find items and advice. We have evaluated many, many items and found them unfit for human consumption.

COMPUTER STORE OF SAN LEANDRO
701 Macarthur Blvd.
San Leandro, CA 94577
415-569-4174
Complete ATARI 400/800 systems—business systems from Altos—books, magazines—modems—disk drives—printers—memory chips. Complete selection of games, utility, business, educational software.

DALE'S TV & RADIO INC.
2400 Athens Ave.
Redding, CA 96001
916-243-7084
Authorized ATARI service computers & home VCS game systems—TV & stereo repairs.

G.A.M.E.S
6626 Valjean Ave.
Van Nuys, CA 91406
213-781-1300
Orders call 800-626-9592
10529 Ellis—Fountain Valley
2814 W. Sepulveda—Torrance
3649 T.O. Blvd.—Thousand Oaks
Complete hardware and software for ATARI at super discount prices. We are the first to receive new products & manufacture several of our own accessories. Send $2 to our Van Nuys address for our catalog.

SOFTWAIRE CENTER
477 University Ave.
Palo Alto, CA 94301
415-327-0520
Complete line of software for business, home and pleasure. Also a wide selection of books, magazines, and accessories for the ATARI and all personal computers.

SOUND ROOM
1100 W. Lincoln
Anaheim, CA 92805
714-635-8621
Complete line of ATARI hardware & software—printers—disk drives—joysticks, books, magazines, software, games, utilities, educational.

THE GRAFEX COMPANY
1112 Arlington Ln.
San Jose, CA 95129
408-996-2689
Box 1558
Cupertino, CA 95015
408-996-2689 Voice 408-253-2516 BBS
Northern California's exclusive ATARI microconnection dealer. The most comprehensive selection of software and hardware for your ATARI home computer. Send $1 for catalog (refunded with your first order).

LEARNING TREE COMPUTER CENTER
2431 N. Tustin Ave.
Santa Ana, CA 92705
714-667-1575
Complete line of ATARI COMPUTERS and software products. Specializing in home, education and business software. AUTHORIZED REPAIR SERVICE CENTER for all Atari and Epson products. Atari Club meets 3rd Thurs. of each month. Write for free catalog.

THE SOFTWARE DEPOT
2652 Towncenter Mall
Sunnyvale, CA 94086
408-730-9494
Microcomputer software, books and accessories for ATARI, Apple, IBM, TRS, VIC and TI computers. Video games for ATARI, Coleco and Mattel. Authorized ATARI computer sales and service.

SOFTWARE CENTER
477 University Ave.
Palo Alto, CA 94301
415-327-0520
Complete line of software for business, home and pleasure. Also a wide selection of books, magazines, and accessories for the ATARI and all personal computers.

QUEMENT ELECTRONICS
1000 S. Bascom
San Jose, CA 95128
408-998-5900
Largest selection ATARI software, books, magazines, discount prices. Our lines include A.I.—Epyx—Synapse—Don't Ask—Online—Spinnaker—PDI—APX—Mosaic—LJK—Datasoft—Broderbund and more.

COLORADO

ALPHA CENTER
12351 W. 64th
Arvada, CO 80004
303-421-6361
Open 7 days a week. ATARI—TI—Timex—Commodore—Corvus—NEC—Source—Epson—Prowriter. Authorized repair center.

CONNECTICUT

THE COMPUTER CENTER
Millrock Rd.
Old Saybrook, CT 06475
203-385-1587
ATARI hardware & software. Programming seminars, books, magazines, T.I., Northstar & Altos. Programmers wall chart available. Call or write for details.

FLORIDA

ORANGE BLOSSOM HOBBIES
1975 N.W. 36th St.
Miami, FL 33142
305-633-2522
Hardware/software/peripherals.

GEORGIA

COMPETITIVE EDGE INC.
Aberdeen Village Ctr.
Peachtree City, GA 30269
404-487-6460
All ATARI products sold below suggested retail. Computer classes in use & programming—youth & adults. Personalized evaluations of individual computer needs. Other personal & business computers available.

ILLINOIS

COMPLETE COMPUTING
890 E. Roosevelt Rd.
Lombard, IL 60148
312-620-0808
Best selection of ATARI software in western suburbs. 10% discount software club. Superb selection of books, magazines. Basic and advanced programming classes. Excellent technical support for ATARI. Loves bad puns.

VIDEO, ETC.
465 Lake Cook Rd.
Deerfield, IL 60075
312-498-9669
Hundreds of ATARI software programs including games, educational and business. Complete service. Full line of peripherals, periodicals & books. VIDEO ETC. Deerfield, 498-9669; Buffalo Grv, 459-6677; Skokie, 675-3655; Orland Pk, 460-8980.

DIGITALWORLD INC.
711 Army Trail Rd.
Addison, IL 60101
312-628-9222
Complete line of all ATARI products. ATARI service center. Full line of ATARI software & a full line of books & magazines. No shipping charges on pre-paid orders or on serviced equipment.

CENTRAL SERVICE CO.
1920 W. Peterson Ave.
11714 S. Western Ave.
Chicago, IL
23 W. North Ave.
Northlake, IL
312-338-6000
3 locations to service computers, games, video recorders, video disc, televisions, stereo, microwave ovens.

SHUTTER SHACK INC.
201 S. Linden
Normal, IL 61761
309-452-2511
ATARI products and software. APX and third party. Authorized service. Epson printers. Omni discs. ATARI books & magazines. MC & VISA accepted. Will ship C.O.D. anywhere in continental U.S.

KENTUCKY

CHAMCO INC.
2511 Preston Hwy.
Louisville, KY 40217
502-637-3604
Factory authorized service on ATARI video games, and home computers.

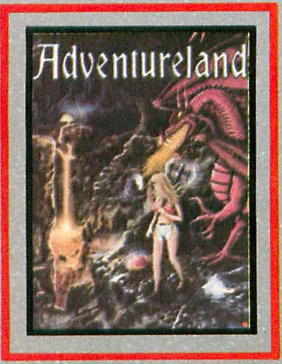
continued on page 132

Hello, We're Adventure International



And we're publishers of some of the finest microcomputer software programs available.
If you can write a **top-quality** program, or can convert some of our best-sellers to other computers, we want to hear from you — Now.
We have the advertising, international distribution, manufacturing and marketing know-how to send top-quality programs to the top of the charts.
If your program **is top quality** — give us a call, or write for our Adventure International Author Information Kit.

Adventure INTERNATIONAL



We are publishers of the top-selling Scott Adams Adventure Series and other fine Entertainment and Applications Programs.

Box 3435
Longwood, Florida 32750
Telephone: (305) 862-6917
Ask for Author Assistance

GOTO DIRECTORY

MARYLAND

FREDERICK COMPUTER PRODUCTS
5726 Industry Lane
Frederick, MD 21701
301-694-8884
ATARI hardware & great selection of software from many manufacturers. ATARI & other peripherals.

BUSINESS COMPUTER CENTER
8659 Baltimore National Pike
Ellicott City, MD 21043
301-461-2200
BCC carries the complete line of ATARI products along with one of the largest supplies of third party software and hardware available at reasonable prices. Additionally we are a full service dealer.

A-BIT-BETTER SOFTWARE
Post Office Box 28
Laurel, MD 20707
301-953-7556
A-Bit-Better Software offers you an extensive variety of exciting programs for your ATARI 400/800. Quality is a must, and our reasonable prices give us the edge. Write for free catalog.

LOWENS
7227 Wisconsin Ave.
Bethesda, MD 20814
301-652-1289
Hardware—ATARI 400/800—VIC—peripherals—Percom disk drives. Full line of ATARI and third party software. Specializing in educational & business software.

MASSACHUSETTS

CUSTOM ELECTRONICS INC.
238 Exchange
Chicopee, MA 01013
413-592-4761
Hardware, software, peripherals—service for ATARI products. Guaranteed to satisfy your needs. We are "the business which service built". Now in our 22nd year.

THE BIT BUCKET
1294 Washington St.
West Newton, MA 02165
617-964-3080
The widest selection of ATARI hardware and software in New England. Authorized ATARI repair. Books & magazines. Seminars and classes for ATARI. Also carrying Osborne, Altos, and Timex.

THE GAME SHOP
427 Great Rd.
Acton, MA 01720
617-263-0418
10 If you need ATARI stuff then
20 GOTO the Game Shop
30 Poke around
40 Peek hardware, software, printers
50 Peek modems, books, magazines
60 Return (often)

MICHIGAN

BINARY CORP.
3237 Woodword Ave.
Berkeley, MI 48072
313-548-0533
ATARI hardware & software. FASTCHIP and The Terminal program. ATARI & other peripherals. Books & magazines.

RITEWAY ENTERPRISES
8262 12 Mile Rd.
Warren, MI 48093
313-751-2454
Hardware/Software/Peripherals/books. Over 500 ATARI programs in stock. Epson—NEC—C.IToh—Okidata printers —Percom drives—BMC monitors—Hayes. Everything for ATARI. Everything discounted everyday.

MINNESOTA

WIZARD'S WORK
County Rd. 18 & 36th Ave. N.
New Hope, MN 55427
612-546-0311
Complete ATARI computer center. Hardware/software/books/magazines. Over 500 software programs stocked. Instructional classes. Repair center.

MISSOURI

INSTANT REPLAY LTD.
14422-24 S. Outer 40 Rd.
Chesterfield, MO 63017
314-576-0544
Software/books/accessories/hardware. St. Louis' complete ATARI computer center. Innovative and exclusive products like Sidewriter—a typewriter keyboard for the 400, joystick repair kits. We mail order all products.

SCREEN SONICS
14416 S. Outer 40 Road
Chesterfield, MO 63017
314-434-0433
Authorized ATARI service thats as good as ATARI. 400 & 800 computers received on Monday. Normally repaired and shipped out within 7 to 10 working days.

SCREEN SONICS
14416 S. Outer 40 Road
Chesterfield, MO 63017
314-434-0433
"Sidewriter" professional auxiliary keyboard for ATARI 400 & 800 owners that lets you sit back & enjoy your computer small businesses. Now you can have two points of entry with one computer "customer service" & products available for the serious ATARI user.

COMPUTER STOP, INC.
3622 Noland Ct., Ste. E
Independence, MO 64054
816-252-1905
ATARI hardware & software. ATARI service center. We handle nothing but ATARI and third part software for ATARI. Accessories—Books—Training. ATARI users Group.

NEVADA

COMPUTER CENTER
3310 S. Jones, Suite D
Las Vegas, NV 89102
702-873-5055
ATARI computers, peripherals. Large selection of business applications & game software.

NEW JERSEY

WAYNE COMPUTER SOFTWARE
1459 Rt. 23
Wayne, NJ 07470
(201) 628-7318
Across from Packanack Center, by Wayne Manor
Largest selection of software, peripherals, accessories and books you will ever see in one store — at super prices!!! Call for hard-to-find items and advice.

SOFTWARE ASYLUM, INC.
626 Roosevelt Ave.
Carteret, NJ 07008.
201-969-1900
Also Old Bridge
201-536-1401
We ARE ATARI! NJ's largest retailer of Atari programs for 400/800 models; over 400 programs available from more than 60 manufacturers. Send for our latest catalog — only $2.00 (refundable as credit with purchase).

EARTHRISE COMPUTER CENTER
6 Green Village Rd.
Madison, NJ 07940
201-377-4084
ATARI, NEC, Franklin computers. Complete software selection. Computer classes.

CIRCLE VIDEO & ELECTRONIC
Circle Plaza Shopping Center
Eatontown, NJ 07724
201-542-8897
We carry ATARI hardware & software/ authorized repair/books & magazines, seminars & classes. Commodore, TI & Franklin.

FELICES FOLLIES
66 Broad St.
Red Bank, NJ 07701
201-842-2862
Hardware/software/peripherals for ATARI/Vic20+64/T.I. 99/Timex/ Sinclair/books & magazines. Printers all on display and ready for a demonstration. The most complete Micro store in Monmouth County.

VIDEO CONNECTION OF SOMERSET
900 Easton Ave.
Somerset, NJ 08873
201-545-8733
Hardware/Software/Service/Books

VIDEO STATION
4 Beachwood Rd.
Summit, NJ 07901
201-273-0024
Hardware/Software/Service

BITS, BYTES & PIECES
190 Buckelew Ave.
Jamesburg, NJ 08831
201-521-2432
We demonstrate ATARI, Commodore and TI programming techniques. We specialize in personalized service. We carry a complete line of third party software—magazines—books. We discount up to 20% below retail.

NEW YORK

LEIGH'S COMPUTER
212 E. 85th St.
New York, NY 10028
212-879-6257
ATARI hardware, software, books. Magazines, programming classes. Apple & Sinclair.

DATA SCAN COMPUTER SYSTEM
2306 N. Ocean Ave.
Farmingville, NY 11738
516-698-6285
Hardware from ATARI—VIC—NEC—IBEX. Complete business systems—books, magazines—peripherals—printers —modem—game—utility—educational software.

SOFTWARE EMPORIUM
151 Mineola Ave.
Roslyn Hts., NY 11577
516-625-0550
Specializing in a full line of ATARI & third party software—games, utilities, business, educational—books, magazines, peripherals—hardware from ATARI—Vic—Franklin—Timex—TI.

COMPUTER CENTER
31 East 31st St.
480 Lexington Ave.
333 West 57th St.
21 West St.
New York, NY
212-889-8130
Largest selection of ATARI hardware & software in New York.

THE VIDEO CONNECTIONS
27 Merrick Ave.
Merrick, NY 11566
516-546-5050
ATARI software, books, magazines. Mention this listing for a special discount on ATARI software.

OHIO

DIGITRENDS
1813 E. 12th St.
Cleveland, OH 44114
216-241-1813
Best selection in Northern Ohio for ATARI hardware, software, books, periodicals, diskettes, computer furniture and accessories. Phone orders and charge cards accepted. Prompt shipment.

ELECTRONIC CONNEXION
424 E. Stroop Rd.
Kettering, OH 45429
513-294-0222
ATARI sales and authorized service. Over 400 programs in stock. Books, magazines, software exchange.

BARNHART STORES
548 N. Main
Urbana, OH 43078
513-653-7257
Hardware/software/service/ peripherals.

COMPUTER CORNER
5104 Mayfield Rd.
Lyndhurst, OH 44124
216-473-5010
ATARI hardware & software for games & business applications. Basic and advanced programming classes. Authorized service center for ATARI, Commodore, Eagle and Epsom.

DATA MANAGEMENT SYSTEM
2979 West Market St.
201 S. Main St.
Akron, OH 44308
216-666-3226
Factory authorized dealer/repairs. Software development marketing.

DALE'S COLOR TV & APPL. INC.
2324 N. Cleve. Mass. Rd.
Bath, OH 44210
216-253-4277
216-659-9330
Service only. ATARI computers and games.

WHITLOW ELECTRONIC CORP.
2150 Noble Rd. E.
Cleveland, OH 44112
216-451-1775
Computer, VCS, Audio-Video, ATARI specialists. Parts and service.

VIDEO DEPOT
1278 Euclid Ave.
Cleveland, OH 44115
216-696-3588
Second largest selection of software in Cleveland. Over 300 pieces of software, Signalmen modems, Alien Group Voice Box. Full selection of books and magazines.

OKLAHOMA

THE COMPUTER MART
3003 East 51st St.
Tulsa, OK 74105
918-664-8452
ATARI computers & software. Northstar & Victor computers. Books & magazines.

OREGON

NORTHWEST COMPUTER SUPPORT
10200 S.W. Nimbus, G1
Portland, OR 97223
503-644-5080

GOTO DIRECTORY

At NW Computer Support we only do one thing. Every effort at every level of our company is to put your computer back on-line. We can provide you the best, fastest, and most reliable service available anywhere—at a price you can afford.

PENNSYLVANIA

AUDIO-PHONICS
1910 Passyunk Ave.
Philadelphia, PA 19145
215-463-4103
Video equipment repair/ATARI computer repair.

MCR
161 Monroe St.
Rochester, PA 15074
412-728-7615
Authorized service center.

MOSTLY COMPUTERS
36 N. George St.
York, PA 17401
717-843-3879
Complete systems from ATARI—VIC—Northstar—books—magazines—disk drives—modems—printers. Full line of business, games, utility, educational software.

CITY SOFTWARE CENTER, INC.
2712 Grant Ave.
Philadelphia, PA 19114
215-969-3330
Largest selection of third party software & ATARI software discounted up to 20%. Blank discs/books/magazines/accessories. Advice on comp. info. Call for prices. Will accept mail order/MC & Visa accepted.

1-STOP COMPUTER SHOPPE
65 N. 5th St.
Lemoine, PA 17043
717-761-6754
Hardware from ATARI—Commodore—Zenith—Osborne—Full line of peripherals & magazines, games, business, educational, utility software supplies.

TEXAS

ALAMO NATIONAL CAMERA SERVISHOP
117 W. El Prado
San Antonio, TX 78212
512-828-3575
Warranty, non-warranty repair of ATARI video games & computers. Complete repair service for photo equipment, VCR, & Video Camera.

THE ELECTRONIC SHOP
2820-24 Walnut Hill Ln.
Dallas, TX 75229
214-350-4003
An ATARI authorized repair service for computers & games.

UTAH

THE SOFTWARE HUT
470 E. 200 South
Salt Lake City, UT 84111
801-355-0066
Hardware/software/peripherals.

SERVICE WEST OF UTAH
3532 S.W. Temple
Salt lake City, UT 84115
801-262-4069
Authorized ATARI service.

QUALITY TECHNOLOGY
741 S. State St.
Salt Lake City, UT 84111
801-521-5040
Hardware, software, service.

VIRGINIA

FUTURE TEK
6230-10 Rolling Rd.
Springfield, VA 22152
703-644-0026
Hewlett Packard, Basis Computer, Audio-Video & projection TV.

VIDEO UNLIMITED SERVICE CENTER
1707 Rt. 17
Grafton, VA 23692
804-898-5318
Authorized ATARI service center. Authorized service for RCA—Sanyo—Hitachi—Sony Video tape recorders, video disc players and TV's. Complete line of accessories. We buy & sell used equipment.

THE AUDIBLE IMAGE
768 Hilltop North Shpg. Ctr.
Virginia Beach, VA 23451
804-422-4429
ATARI specialists—A wide selection of hardware, software, joysticks, keyboards, etc. Games, education, programming & business, all for ATARI! Our customers do our advertising for us.

WASHINGTON

ROB ROY COMPUTER
1109 W. Yakima Ave.
Yakima, WA 98902
509-575-7704
Hardware, software, repair. ATARI & Northstar computers. Business, applications & game software. Authorized ATARI service.

PROGRAMS PLUS
16874 Southcenter Pkwy.
Tukwila, WA 98188
206-575-1375
Software, books & peripherals.

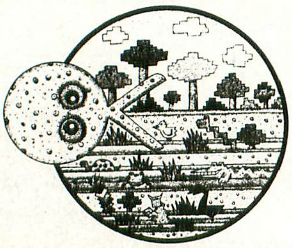
BUTLER'S TV & COMPUTERS
28717 Pacific Hwy. South
Federal Way, WA 98003
206-941-9096
Specialists in ATARI. Warranty service. Hardware—peripherals—magazines—over 200 software titles in stock.

COMPUTERS +
2504 Jefferson Ave.
Tacoma, WA 98402
206-272-2329
ATARI hardware—400/800 Vic-20/Percom disk drives/C.Itoh printers. Software educational, utility—game, books—magazines.

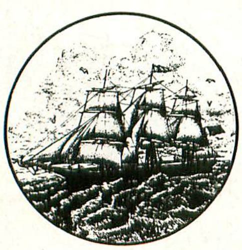
WISCONSIN

BYTE SHOP OF MILWAUKEE
4840 S. 76th
Greenfield, WI 53221
414-281-7004
Systems from ATARI—Apple—Compupro—complete range of games, business, magazines—service & repairs—disk drives—printers—RAM boards—modems.

MAGIC LANTERN COMPUTERS
406 S. Park
Madison, WI 53715
608-251-9112
We are Wisconsin's ATARI headquarters—600 ATARI programs in stock—third party products—also free catalog.







ADVERTISERS

This list is provided as a convenience to readers and as a courtesy to advertisers. ANTIC does not guarantee accuracy or comprehensiveness.



CONJURE UP SOME FUN...
Necromancer
SYNAPSE SOFTWARE
SHADOW WORLD
SYNAPSE SOFTWARE
Available in disk, cassette and cartridge for the Atari 400/800 computers.
These and other titles available soon for the Commodore 64, the VIC-20, TI-99/4A, Apple II, Radio Shack Color Computer, and IBM-PC.
Atari, VIC-20 and Commodore 64, TI-99/4A, Radio Shack Color Computer, Apple II, and IBM-PC are trademarks of Atari, Inc., Commodore International, Inc., Tandy Corporation, Apple Computer, Inc., and IBM, Inc., respectively. All game titles are trademarks of Synapse Software.
synapse
SOFTWARE
5221 Central Avenue, Richmond, CA 94804